FOOD MANUFACTURE

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Christmastide, 1947

THE incidence of publication date makes Christmas greetings premature, but coming events cast their shadows before. Already the shops, bedecked with coloured paper festoons, are assuming an opulent air. The chatter of small children, whose little noses may be seen flattened against the toy-shop windows, is of Christmas stockings and impending joys.

For those of riper years Christmas is not only a date but a temper which defies austerity and the sure prospects of impending deprivations.

> Life still hath one romance that naught can vary,
> Not Time himself, who coffins Life's romances,
> For still will Christmas gild the year's mischances,
> If Christmas comes, as here, to make him merry.

Despite the lamentable attenuation of the rations on Christmas Day, paterfamilias, forgetting calories for the nonce, will don his paper cap, mother will smile tolerantly at his antics and forget the weary hours spent in queues and the little economies which have made the "feast" possible, the younger ones will kiss under the mistletoe, and the babies lovingly hug their plastic dolls and other toys.

In this spirit we wish all our readers, at home and abroad—A Merry Christmas.

The Oils and Fats Position

Exportable fats and oils in the current year are little more than half the quantity in an average year 1935-39, when the flow reached about 5,800,000 tons a year. Far East supplies have been seriously curtailed. The Malayan exports, never a very significant factor, are down to 30 per cent. of the pre-war, while supplies from India and China have practically ceased. Only in the Philippines has there been a symptom of recovery; but the surplus is presumably going to the American market.

Meanwhile, on the European continent the production both of lard and of butter has been falling, the latter partly through the necessity felt by most Governments of diverting milk to the feeding of children and other groups.

The restrictions on whaling make it improbable that the whale oil yield this season will rise above 320,000 tons. This may be compared with the 1937-38 figure of 606,700 tons. Since the oil is apparently to be allocated by the Emergency Food Council, it is unlikely that Britain will receive more than 55,000 tons. As is commonly known, the prevailing shortage of fats has led to the suggestion that the catch of whales might well be increased; but the opinion of the experts is definite. In spite of the war the number of whales has not increased as much as was expected. If the premature slaughter of breeding stock by the farmers is to be matched by a suspension of controls in the whale fisheries, then the outlook for the next decade may be bleak.

The pre-war supplies of oil cake in this country reached on an average about 1,700,000 tons. Of this about a million tons were processed in our own plants. In 1946 total supplies were about 700,000 tons; and in 1947 they are not likely to exceed 1,100,000 tons. This, in the face of our efforts to raise our milk production, is not very encouraging. It is possible that in the coming year supplies will reach an even lower level. The world market has, for example, lost a million tons of oil cake from India. Before the war India exported some 400,000 tons of oil cake, as well as oil seed that would, when processed, yield the equivalent of 700,000 tons of cake. Further seed exports were prohibited in 1946; and since Indian economists have plans for the improvement of their own livestock, it seems improbable that shipments will be renewed for an unpredictable time to come.

The Egyptian export of cottonseed cake was

mainly diverted in 1946-47 to Europe. Prior to the war we had received from that source some 250,000 tons annually; and during the war shipments practically ceased. When they were renewed in 1946 at the low level of 60,000 tons, Britain had already had her allocation and reaped no benefit. The Manchurian pre-war supply of about a million tons of cake has practically dried up; there is little prospect of recovering it for the West, though that of course will depend chiefly upon the result of the struggle for power that is now taking place in that region of the world. The Argentine sources of supply, upon which we have now to depend in great part, are at best uncertain. Not only is the Argentine a dollar country, but transport and shipping difficulties have considerably delayed the movement of all kinds of food and feedingstuffs. Moreover, the Argentine is now processing its own produce in its own mills; and this tends to increase the price that has to be paid both for the extracted oil and for the cake.

An assessment of the groundnut project in West Africa shows that any large supplies are not likely to be realised before the early 'fifties, and it must be admitted that at present the whole scheme is highly experimental. The major problems at present appear to be those of transport and harbour facilities, and organising and training the labour force. Finally, the scheme envisages the extension locally of livestock production; and we can suppose in that case that sooner or later the suggestion will be made for the processing of the groundnuts in Africa and the retention of the oil cake for local feed. On all counts the oil cake position is not very promising.

Food from Denmark

There was quite a little hubbub in the House of Commons recently about the Danish butter question. Air Commodore Harvey asked Mr. Strachey whether the Danes, since the negotiations with Britain, had disposed of their next six months' production of butter, 24,000 tons, to Russia and five other countries. Mr. Strachey said that the Danes had this year sold less butter to Russia and other destinations abroad than last year, and he warned hon. Members about accepting at its face value information put out by the Danish Government, very naturally, because of these negotiations. This brought forth one or two indignant questions to the Food Minister as to whether he was imputing lack of veracity to the Danish Government, to which he replied that he was impugning statements which merely reflected those made by the Danish Government where, in the negotiations, they gave their side of the case and pointed out that there was a British side which hon. Members showed a tendency to overlook.

It is pleasing to note that there are real hopes that by one means or another it will be possible to resume trade talks with and purchases from the Danes. But we are not willing to buy at present prices; for one thing it would be grossly unfair to the Dominions.

In the meantime, it is a pity that the Danish-Russian Agreement was in some quarters inaccurately related to the failure of the Anglo-Danish trade talks. The Russians are not at present even buying as much from Denmark as they did last year and the deal has not encroached on the amount available for us to buy.

The position is now that food supplies cannot be purchased from soft currency areas because the price is too high. This policy has reduced the bacon ration to the absurd amount of a weekly ounce. A writer in *The Economist* suggests that this is a good case for de-rationing and de-subsidising that foodstuff and allowing those consumers who will to pay the higher price. To do this for bacon at the moment could not be said to be starving the poor.

Civil Service Organisation and Methods

The steadily increasing power of government departments over business and industry would cause much less friction and frustration if the methods of the Civil Service were in reasonable harmony with the methods of organised commerce. Much of the unpopularity of controls and forms arises over detail rather than principle. In this connexion, we doubt if a more revealing and timely document has ever been published by the Stationery Office than the recent Select Committee Report on Organisation and Methods in the Civil Service. For some time a very minute section in the Civil Service has been known as O. and M., its task being to analyse problems of internal system and organisation when asked to do so by any particular department. The Select Committee listened to a great deal of evidence from O. and M. officers and from heads of government departments in which O. and M. assistance had been given; the *verbatim* account of these

enquiries is an exceedingly interesting four-shillingsworth, and we feel certain that many business men would prefer it to their usual brands of literary entertainment.

The intervention of O. and M. in the Ministry of Works housing problems resulted in the reduction of forms for builders to fill up from 144 to 38. Intervention in the Forestry Commission's methods enabled state foresters to look after trees instead of becoming overloaded with form-filling and book-keeping duties. The overload problem of the Divorce Registry was considerably relieved at the clerical end even though, as is stated in the Report, the reduction of co-respondents was unhappily outside O. and M. terms of reference. The British Council, the Royal Society, the Southern Rhodesian Government's London offices, have all had their problems of administration eased by O. and M. investigation and advice. But no evidence was given to suggest that O. and M. had been able to assist the Ministry of Food, a remarkable omission when one considers what an enormous avalanche of forms cascades daily from that single branch of government. If builders now have 38 forms to fill instead of 144, surely the food industry might expect similar relief if only O. and M. officers could get cracking with the Ministry of Food?

Two points emerge most strikingly from the Report, especially if one reads between its lines. The first is that, within the Civil Service, the O. and M. section is suspect, called in not for the obvious sake of efficiency but largely or only when a department is actually breaking down. The second is that the number of O. and M. officers is far too small, and their rate of remuneration and status are both inadequate so that good men tend to leave Whitehall and serve in private enterprise instead. It would be an excellent thing for this country if a very large number of business men studied this Report and then exerted upon Whitehall as much pressure as they could to stimulate a more rapid expansion of O. and M. power. In his evidence, Sir Edward Bridges, Permanent Secretary to the Treasury, said that the effect of O. and M. must be slow because "you do not change the whole outlook of a profession overnight." This point of view may be realistic enough, but it hardly squares with the fact that government departments themselves are frequently given the power to change the pattern of industry overnight; it would surely seem to be their duty to attune their methods with those of any reasonably efficient business, for this is no time for professional etiquette, professional habits, or professional reaction. The Report left us with the feeling that Whitehall knows and possesses the means of easing both its own burden and the burden it places upon industry, but the development of that means—O. and M.—is being soft-pedalled.

Quick Frozen Meat

Councillor C. W. Hewson and Mr. J. Morris went to America to investigate the frozen meat trade. Putting forward a warning to the British trade, at a session of the Bournemouth conference of the National Federation of Meat Traders' Associations, Mr. Hewson said that although the Americans had spent many thousands of pounds installing plants and shops with cabinets, it was a complete failure. During a period of shortage, shops which handled quick frozen meat met with some success, but immediately there was more meat available the housewife no longer wanted it frozen, she wanted it fresh. He was, of course, referring to the sale of packaged quick frozen meat cuts for retail sale. Quick frozen vegetables and fruits trade was quite another matter; this was flourishing exceedingly.

Mr. Morris had the same story to tell. He also mentioned the latest form of perishable food presentation—the vacuum pack—something entirely new to him. Bacon, which at the time of his visit, was the only commodity being packed by that process, was wrapped in Cellophane and would keep perfectly for three months without refrigeration and storage.

Food Deterioration

During September, 1947, the Division of Agricultural and Food Chemistry of the American Chemical Society held its symposium on changes occurring in foods during storage. The extent to which research is being carried on in this connexion was demonstrated by a paper read by George Gelman on food deterioration in general. He categorised food research studies into four major headings: (1) acceptability, (2), utility, (3) nutrition, and (4) stability or prevention of deterioration.

Stability investigations are being conducted from three principal viewpoints: (1) chemical, (2) microbiological, and (3) physical.

Chemical studies include six programmes: (1) non-enzymatic browning, (2) lipide oxidation

and rancidity, (3) starch retrogradation, (4) catalysis, both biochemical and inorganic, (5) nutrilite breakdown, and (6) multiple factor investigations on selected foods.

Microbiological studies include: (1) bacteria, (2) yeasts, (3) moulds, and (4) selected food investigations, while physical studies include: (1) histology, (2) biophysics, and (3) selected food investigations.

Only through a basic understanding of the nature of the various deteriorations, separately and in combination, can significant progress be made in preventing or minimising food deteriorations. Changes will be reflected in: (1) raw material quality, (2) handling and processing, (3) packaging and packing, (4) shipping, (5) storage, and (6) meal preparation.

Mechanisms of food deterioration are being unravelled. Together with the results evolving from the other studies comprising food research, a scientific basis will be provided for developing foods that will be more acceptable, more readily utilisable, more nutritious, and more stable.

Currants and Puddings

Though raisins or "great raysyngs" for sweet puddings have been with us ever since the thirteenth century imports from Portugal, Spain and the Levant, currants came later. They were brought from Greece—the word is a corruption of Corinth—in times when as a common commodity their worth contrasted with today, with the housewife treasuring dried fruits commanding their "points." Long ago Sir Thomas Roe deplored our "great and needless consumption," for we took more than half of the 7 million lb. from Zante, that isle in the Gulf of Corinth: "Here is a little island or two that devowres our money, returnes nothing but a trash berry, takes none of our native merchandise, and in conclusion laughs at us." Indeed, the people of Zante believed that we must feed them to pigs as they did in days of glut. A decade or two before Roe's lamentation Christmas pudding was a sort of plum porridge concocted of meat broth, raisins, wine, fruit juice, and brown bread. "Christmas Pye" was likewise on the table, with neats'-tongues, chicken, eggs, sugar, raisins, and "various kinds of spicery" therein.

The English pudding received full praise in *Monsieur Misson's Memoirs* of 1719: "Blessed be he that invented Pudding; for it is a manna that hits the Palate of all sortes of people." Later it became a sweet strangely described in the Almanach des Gourmands as a *Mélange indigeste et bizarre plutôt qu'une préparation savante et salubre*. Indigestible or bizarre, we shall not worry unduly even if it be hardly a "wise" preparation, nor trouble unduly over Thomas Roe's rather topical criticism of our imports without exports, so long as the hot steaming concoction comes, like Christmas cheer, once a year.

Errant Boys

"I only know two kinds of boys: mealy boys and beef-faced boys," cried one of the characters in *Oliver Twist*. But then he had never studied the errand boys of Britain, those diverse creatures linked by name and custom to the knight-errants of old and to Don Quixote in particular.

> This is a slight unmeritable man
> Meet to be sent on errands.

Antony's "unmeritable" applies well throughout most of the year to these errant lads; or so the housewife thinks as first the butcher's boy and then the grocer's boy arrives late, if he arrives at all, displaying many of his saucy manners since he knows too well that a labour shortage in his particular line preserves him from complaints and the sack. "Where is my wandering boy tonight?" ran the lugubrious line of the music-hall song. And where is he any other time, thinks his employer, as he scans the road for signs of the youngster.

But just now, with Christmas near, note the subtle change! Errand boys and Christmas boxes; the two have been indissolubly linked ever since the tripping apprentices went the rounds of their masters' customers, carrying the earthenware "box" or wide bottle, specimens of which are still to be seen in the British Museum. The errand boy with cheerful grin, maybe carrying a bit of liver or some little extra his master has sent, but carrying it as if he himself had the favour to bestow—how well he anticipates the Christmas offering! The lad in the magistrate's court the other day who gave his occupation as "retail food distributor" was just a little chagrined when the clerk to the court asked: "You mean what we used to call an errand boy?" But not for long would he lose his composure. With his whistling or his Sinatra song so hard on the ear he would soon be out again, as perky as ever, the only "change" being that which he extracts from our pockets these pre-festive days.

Packaged Food Products

The story of Newball and Mason, Ltd., who in 1950 will celebrate their first centenary, is one of development from a small herbalist shop in Derby Road, Nottingham, to a concern of national importance.

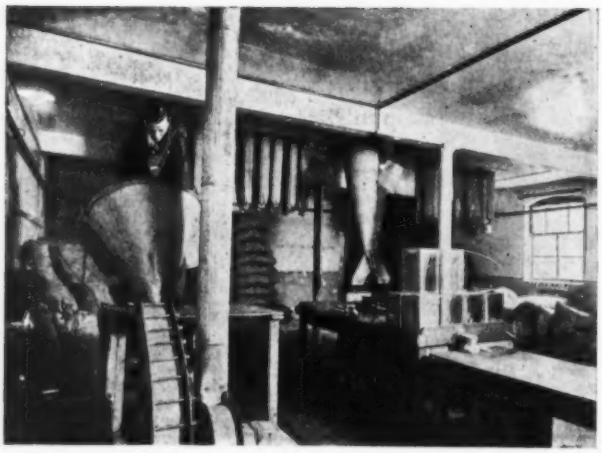
THE company first came into prominence about 1860, when extract of herbs formula was first packed in 3 oz. bottles and marketed through retail shops for the home-brewing of herb beer. The popularity of this product necessitated the renting of a factory on Park Row in 1875 and the installation of what was at that time considered an ultra-modern plant for the recovery of essential oils and the production of extracts.

The use of this plant brought the company into the sphere of general pharmaceutical and flavouring extract manufacture, and development continued along these lines until 1890, when increased demand necessitated the move to new and larger quarters at Hyson Green. At these works the manufacture of food products such as custard powder, blancmange powders, and health foods was started on a small scale, and the works were again outgrown, until in 1902 the present factory on Beech Avenue, Nottingham, was purchased and new plant installed.

In 1939 it became evident that the future of the company lay in the production of foods and beverages rather than in chemicals and pharmaceutical products. Production was reorganised, out of date plant scrapped, and the necessary modern plant installed for the processing of coffee, gravy, and soup powders, and the development of food flavours and colours for household and catering use.

A tract of 250 acres of land was purchased at Bunny, Notts., and considerable progress has been made in the growing of herbs and soft fruits used in the company's products. The declaration of war in 1939 interrupted development to some extent, and the Bunny property was used to grow those products most needed by the nation, while the actual requirements of the works had to be disregarded. Schemes, however, have been developed

The green coffee is fed into a hopper above the roaster and the roasted coffee is then conducted into a cooling drum.



The mill in which one cwt. of coffee can be ground in less than five minutes.

for the future building of an up-to-date food factory on the Bunny site. This factory will be surrounded by ornamental gardens and recreational grounds for the staff, and in these pleasant surroundings will be developed a food and beverage plant which will be a credit not only to Nottinghamshire county, but to the nation.

The most recent enterprise of the company is the acquisition of the only pilchard factory in the country at Mevagissey, Cornwall. A description of this factory was published in FOOD MANUFACTURE, August, 1947.

Vacuum Pack Coffee

The preparation of coffee, packed in gas-filled tins, is one of the company's many activities.

The selection of the coffee beans to ensure the best possible blend is the first step. For the roasting operation, the green coffee is fed into a hopper above the roaster and the roasted coffee then conducted into a cooling drum, and thence to the blending bins.

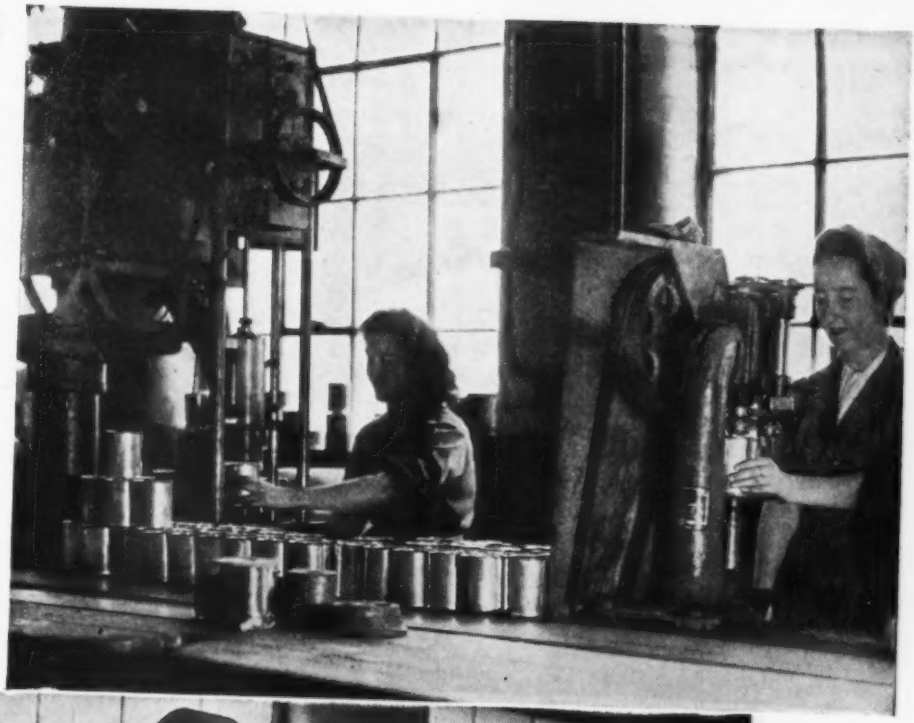
After the coffee has been in the roaster for a short time the colour gradually deepens. The beans shrivel up until about half done and then pop open. This is the point at which the experienced roaster man finishes the roasting as quickly as possible.

During roasting, the beans lose about 16 per cent., this corresponding to loss of moisture.

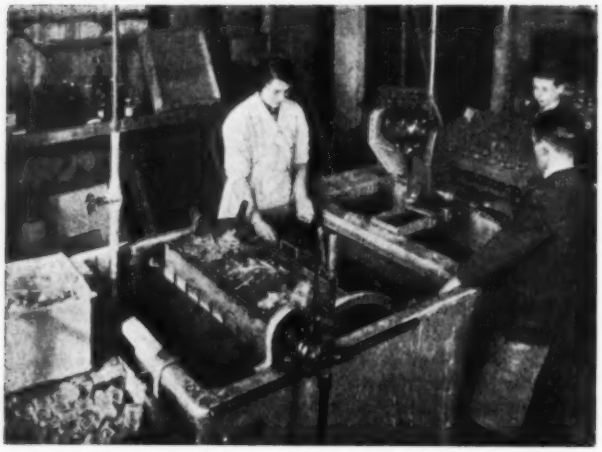
After roasting the cooling and stoning operations are carried out by the appropriate equipment.

The filled cans enter the vacuum chamber, where their contained air is removed. In the same chamber this air is replaced by carbon dioxide gas.

Right: The coffee is automatically weighed and filled.



Below: White pepper being filled into packets by an automatic filling machine.



Bottle washing machinery.

Grinding

After cooling and stoning, the coffee is ready for grinding and packing. One of the types of equipment used in the factory under review is the Miracle mill, by which 1 cwt. of beans may be ground in less than five minutes. Graded grinding is also being carried out, enabling the article to be passed without further treatment to the packing department.

In grinding, the beans are introduced into the conical hopper and pass into a long receiving shaft, and then enter a drum in which revolve hammers of hard steel. Air is forced into the chamber, which forces the material into the "beating" area, and the beans, now broken up into small particles, are finally thrown on to a sieve grating. The degree of grinding is determined by the inserted grate.

Weighing and Filling

The ground coffee is packed by means of equipment which weighs out an exact weight and rams it into the tins, which are then double-seamed.

The tins are next conveyed to the exhausting chamber, which, by means of a vacuum pump, extracts the air from the filled tins through a small hole left in the lids. This operation being concluded, the air is replaced by carbon dioxide gas and the perforation in the lid closed with solder.

Herbs and Parsley

Herbs and parsley are dried at the Kaloroil drying plant on the Bunny Farm, after which they are sifted by machinery to eliminate foreign matter and a ball mill employed for fine grinding. Filling into ½ oz. Cellophane packets is carried out automatically.

The Still Room

The preparation of essential oils and extraction of fruit juices is carried out in a separate extension of the factory in which the latest equipment has been installed.

The preceding account does not cover by a long way the numerous items turned out by the company. The list is a long one, including custard powder, custard flavours of many varieties, wine flavours, junket, food colours, baking powder, and health salts.

The general impression gained by a tour round the factory is that those concerned are keen to take advantage of the latest methods of manufacture, tending not only to ensure high quality but economy in handling.

The laboratories are spacious and well lit.

SUPPLIERS OF EQUIPMENT

Automatic weighing and filling machine: *George Driver and Co., Ltd.*
Exhaust chamber: *Metal Box Co., Ltd.*
Cans: *Metal Box Co., Ltd.*
Cellophane packets and display outers: *E. S. and A. Robinson, Ltd.*
Steam jacket mixer: *Wm. Gardner and Sons (Glos.), Ltd.*
Ball mill: *Hathernware, Ltd.*
Coffee roaster: *Whitmee Engineering Co., Ltd.*
Glass bottles: *United Glass Bottle Co., Ltd.*
Cartons, cases, and cardboard: *Thompson and Norris, Ltd.*
Spice and powder filling machines: *Alite Patent Machine Co., Ltd.*
Mills: *Miracle Mills, Ltd.*
Mixers: *Hobart Machine Co., Ltd.*
Drying Plant: *Kaloroil, Ltd.*

The Use of Scientific Instruments in Chemical Analysis

J. H. GLOVER, B.Sc., A.R.I.C.

PART IV.—POLARIMETRY

MANY chemical compounds possess the power of rotating the axis of vibration of polarised light, this property being known as optical rotation or optical activity. The science of polarimetry is concerned with the quantitative examination of optical rotation.

Optically active compounds include a wide variety of substances, mainly organic, although many of the co-ordinated inorganic compounds possess activity. Perhaps the sugars are the most important group of optically active compounds, and many polarimetric methods are used for their analysis.

Asymmetry of molecular structure is the factor conferring optical activity upon a compound. Usually an asymmetric carbon atom is the cause, *i.e.* one with four dissimilar substituents, but absence of a coplanar structure due to restricted movement of organic groupings may also cause optical rotation.

The rotation of a particular compound in solution is dependent on its concentration according to the equation:

$$\text{Rotation} = \frac{100 \times a}{c \times l}$$

Where a is the specific rotation,
c is the concentration in gms. per 100 ml.,
l is the length of solution, in dms., through which the light passes.

The specific rotation of an optically active substance is the rotation produced by a solution containing 1 g. per ml. and of length 1 dm. The temperature of the solution and the wavelength of the light used also have an effect on the rotation, and the rotation of a compound is always defined with respect to these two variables, *e.g.* the symbol $[\alpha]_D^{20}$ would indicate the rotation of a compound at 20° C. using the sodium D line as a light source.

Some idea of the nature of polarised light may be gained as follows. A beam of normal light may be considered to be the result of vibrations in all directions perpendicular to the direction of the beam; linearly or plane polarised light is the result of vibrations in one plane only. Thus if it were possible to take a cross-section of each type of beam, then normal light would give a circle, and plane polarised light a straight line. Intermediate conditions between these two states exist and are grouped as elliptical polarisations.

The polarimeter is an instrument for the measurement of optical rotation. Its components include a polariser for the production of polarised light from normal light, and an analyser by which the rotation is measured. A circular scale graduated in angular degrees is fixed to the analyser, and the solution under examination is contained in a special tube placed between polariser and analyser. The function and composition of each constituent part will next be discussed.

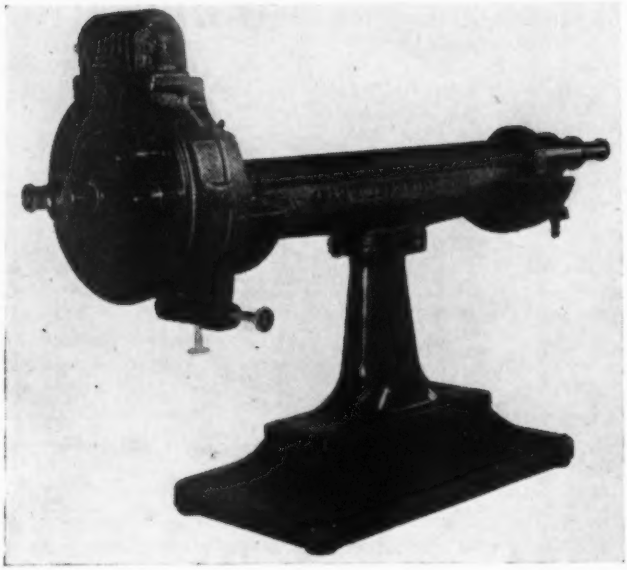
Construction of Polarisers

Polarisers are almost invariably manufactured from crystals exhibiting the property of double refraction, or bi-refringence. This property may best be described by assuming a normal light beam to be resolved into two components, one vibrating in a direction at right angles to the direction of vibration of the other. In a bi-refringent crystal the refractive index with respect to light vibrating in a direction parallel to the optic axis of the crystal differs from that for light vibrating in a direction perpendicular to this axis. Hence, according to the angle at which the light enters the crystal with reference to the optic axis, different effects will be observed. Assuming the faces of the crystal to be parallel to or perpendicular to its optic axis, these effects may be summarised as follows:

1. If the light beam strikes the crystal parallel to the optic axis both components will vibrate perpendicularly to the axis. Hence, only one refractive index operates and the light beam passes straight through. No refraction will take place since the angle of incidence is 0°.

2. If the beam is perpendicular to the optic axis, one component will vibrate perpendicular to this axis and the other parallel to it. Hence, the two refractive indices will operate and the components will travel with different velocities. No refraction will take place since the angle of incidence is again 0°.

3. When the beam makes an angle between 0° and 90° with the optic axis refraction takes place according to the normal laws of optics. The two



Modern polarimeter of the type used in industrial laboratories. The scale on the left is completely enclosed and is viewed by means of the eyepieces on either side, the illumination being provided by a small lamp housed on top. The half shade device is of the Lippich triple field type. *Courtesy Adam Hilger, Ltd.*

components, being governed by different refractive indices, will suffer a different amount of refraction. They will therefore be separated and will travel with different velocities.

Hence, condition 2 gives rise to two beams of polarised light travelling along the same path but with different velocities; and condition 3 produces two separate beams of polarised light travelling along different paths and with different velocities, the two polarised beams vibrating perpendicularly to one another in each case.

The two beams are given the names ordinary and extraordinary ray. The ordinary ray is the one governed by the refractive index in the direction perpendicular to the optic axis; hence, in condition 1 the ordinary is the only one formed. The ordinary ray is usually the one governed by the larger of the refractive indices.

The construction of polarisers is based on conditions 2 and 3. They consist of two equal halves of a bi-refringent crystal. The two halves are combined so that an interface is formed oblique to the light path. This interface is arranged at such an angle that it serves a dual purpose. by preventing deviation of the light path and also by causing the ordinary ray to be totally internally reflected while the extraordinary ray is transmitted; thus giving rise to a single beam of plane polarised light travelling in a direction parallel to that of the incident light.

Calcite is the usual material used for the construction of polarisers. It has refractive indices of

n_o 1·6584(D)
n_e 1·4865(D)

(Suffixes o and e indicate ordinary and extraordinary ray respectively.)

Sodium nitrate has also been proposed since it has definite advantages over calcite, being more strongly bi-refringent.

The Glan prism is a type of polariser based on condition 2. It consists of a crystal of calcite so cut that the incident light beam is perpendicular to the optic axis of the crystal and strikes the surface of the crystal perpendicularly. The crystal is cut diagonally and there is an air interface between the two halves. The ordinary ray is reflected completely at the first surface of the interface, while the extraordinary ray passes through after undergoing refraction at the two surfaces. This refraction causes a slight displacement of the beam, although it is still parallel to the incident light.

This displacement is a drawback, since on rotating the crystal the emergent ray of polarised light turns in a circle and is a source of error in matching as will be seen later. The fault is minimised by having the interface as thin as possible. There is a partial reflection of the extraordinary ray at the two surfaces of the interface, which results in a loss of light; this is another disadvantage of the Glan prism, its main disadvantage being its small field, since only parallel light may be used.

The Glasebrook or Glan-Thompson prism removes many of the disadvantages of the Glan as a polariser. The chief advance lies in the use of different material for the interface. Balsam, linseed oil, and various synthetic resins have found application as interface compounds; linseed oil cuts out all reflection of the extraordinary ray at the interface surfaces, thus giving a polarised beam of greater intensity.

In both the Glan and Glan-Thompson prisms the faces of the prism are either parallel or perpendicular to the optic axis, whereas in calcite crystals the optic axis is very oblique with respect to the natural faces. The calcite crystal must therefore be considerably cut down to fulfil the conditions for a Glan-Thompson prism, thus increasing the cost.

A considerably cheaper polariser is the Nicol prism; the natural faces of the crystal are much

less corrected and the incident light strikes the prism face at an angle between 0° and 90°, thus the Nicol prism is governed by condition 3. The displacement of the emergent polarised beam from the Nicol is of greater magnitude than in the Glan and the Glan-Thompson, due to the obliquity of the faces with respect to the optic axis; also there are difficulties in the measurement of rotation with Nicol's which render this type of prism unsuitable for high precision work.

It is of practical importance to note that the total reflection of the ordinary ray is partially governed by the angle of incidence of the unpolarised light upon the polariser; the limits between which this angle must fall are fairly narrow for most polarisers in order that a pure polarised beam may result. Care should therefore be taken in the alignment of the prism with the light source, and the incident beam should not pass through a condensing lens system so that the light is made to converge on the polariser. Although this might give a greater intensity of illumination, it would also result in the passage of unpolarised light through the prism.

The Analysing Prism

Having obtained a pure beam of polarised light, it now remains to measure the rotation of such a beam by an optically active solution. This measurement is the function of the analyser and the mechanism may be understood more easily by considering first the inter-effects of the polariser and analyser without the optically active solution between them. The analysing prism of a polarimeter is identical in construction to the polariser, so that if polarised light strikes the analyser in such a way that its direction of vibration is perpendicular to the optic axis of the latter, then it becomes governed by the ordinary refractive index and is totally reflected. If the vibration is parallel to the optic axis the extraordinary refractive index becomes the governing factor and the beam will pass straight through. Thus, if the optic axis of the analyser is at right angles to that of the polariser, the extraordinary beam from the former becomes the ordinary beam in the latter and no light is transmitted. Such a position is known as "crossed nicols."

If the analyser and polariser are arranged with their optic axes parallel, all the light passes through. If the analyser is rotated with respect to the polariser, the intensity of the transmitted light is gradually reduced until at 90° rotation the position of "crossed nicols" is obtained; the intensity then increases until a maximum is again reached at 180° rotation, "crossed nicols" is again reached at 270°, and finally at 360° rotation we arrive at the first condition of maximum transmittance.

With analyser and polariser in the "crossed nicols" position, an optically active solution may be placed between them, then the rotation due to the solution will alter the "crossed nicols" position by an angle equal to that of the rotation of the solution. For example, a solution of optical rotation of 5° would change the "crossed nicols" angle from 90° to 95° or 85° dependent upon the direction of rotation. Hence, it is theoretically sufficient to find the "crossed nicols" position, interpose the solution to be measured, find the new position by rotation of the analyser, and measure the angle between the two positions. In practice this is not an ideal procedure owing to the limitations of the ability of the eye to locate exactly the position of total darkness. To overcome this difficulty the "half shade" principle of matching was introduced.

This principle entails the division of the viewed field of the analyser into two halves, and fixes a reference position of the analyser at which the two halves of the analyser field are equally illuminated. The principle may be explained by assuming two analyser prisms inclined at an angle of 30° to one another. Denoting the prisms by 1 and 2, when No. 1 is at 90° (*i.e.* "crossed nicols") then No. 2 is at 120° and allows light to pass, when No. 2 is at 90° then No. 1 is at 60° and transmits light of equal intensity to No. 2 at 120° Hence, when both prisms are at an equal distance from 90°, *i.e.* 15°, then both transmit equal intensities and their two fields are equal. The angle 15° is known as the half shade angle.

Half Shade Device

It may be apparent from the above that size of the half shade angle governs the brightness of the field in the balance position; the smaller the angle the nearer the two analysers will be to the "crossed nicols" position and the less light will pass. On the other hand, the bigger the half shade angle the greater will be the rotation range for small brightness differences between the fields. Hence, for accuracy in reading a small half shade angle is necessary, but it must not be so small as to reduce the brightness of the field by too much. In practice the optimum half shade angle is from 4° to 5°.

The simplest half shade device is to have a compound analyser consisting of two smaller prisms cemented together at an angle equal to double the required half shade angle.

A better method is the Lippich prism, in which the analyser is preceded by a smaller prism covering half the field. The optic axes of the two prisms are inclined in order to give the half shade effect. The half shade angle may be varied, according to the transmittance of the solution under test, by

rotation of the small prism with respect to the analyser. It should be noted in this case that the Lippich device gives an asymmetrical half shade effect, since half the light suffers a greater reduction in intensity than the other half due to its passing two prisms. There is also a greater loss by reflection in one half of the field than the other. Hence, field equality does not necessarily mean that both prisms are equally orientated about the "crossed nicols" position. As a result of this asymmetry, the reference position for one half shade angle will not be the same as that for another.

The Lippich Triple Field is an extension of the above principle; two subsidiary prisms are used and the analyser field is divided into three parts.

Other half shade devices make use of quartz plates. Quartz, when cut perpendicular to its optic axis, shows optical rotation, but when cut parallel to this axis shows bi-refringence. In the Laurent half shade device a bi-refringent quartz plate covers half the field. The thickness of this plate is dependent upon the wavelength of the light used. The light emerging from the plate vibrates in a different direction from that in the rest of the field, thus giving the necessary conditions for a half shade effect. The half shade angle may be varied by rotation of the quartz plate. It should be noted that if a quartz plate half shade device is used with light of the wrong wavelength, elliptical polarisations result, making accurate determination of the zero position impossible.

The solutions under test in the polarimeter are contained in special tubes with detachable ends of optical glass. The simple tubes are filled by the removal of one end, filling, and replacing the end. Care should be taken in screwing the locking nuts on, since too heavy a pressure upon these results in strains inside the glass ends which cause elliptical polarisations to occur and alter the match position. Jacketed tubes for constant temperature determinations are available. Tubes are naturally standardised with respect to length, the usual value being 20 cm.

Polarimeter scales, upon which rotation is measured, may be calibrated in angular degrees with various vernier attachments for accurate reading. The Saccharimeter is a polarimeter calibrated directly in percentages of sugar for a given "normal weight" of sample taken. The latter instrument requires calibration with standard quartz wedges of known rotational power.

Sources of light for polarimetry must be as near as possible monochromatic. Sodium lamps and mercury arcs are very commonly used, but even with these sources a filter is advisable to remove extraneous wavelengths.

The main use of the polarimeter is of course in sugar analysis, although many other optically active compounds are capable of polarimetric determination. The techniques adopted are all fundamentally the same: the zero of the instrument is first determined with distilled water in the tube, the water is then replaced by the solution under test and the analyser combination rotated until a match is again obtained; readings are usually repeated two or three times for confirmation. It is important to have the test solution clear and free from all suspended matter, and a "clearing agent" such as alumina cream, lead acetate, or zinc ferrocyanide, is very often used with sugar solutions.

The alignment of lamp and polarimeter is particularly important for the reasons explained, and it is better to have both mounted on the same base so that their relative movement is minimised.

(To be continued)

CORRESPONDENCE

Conversion Tables

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—I have read the review of the book *Cereal Chemistry* in your October issue. I am personally acquainted with Dr. Kent-Jones and feel sure that he could defend himself without my intervention. Nevertheless, I should like to draw your attention to one small point.

You regard the inclusion of certain appendices as redundant, in particular the tables of atomic weight, Fahrenheit degrees, and the equivalent inch/cm., litre/cu. foot, etc.

Kent-Jones' book will be known throughout the world and will be read in many countries; I feel that you do not realise the difficulties that nationalities, other than the English, have with these values. When will the decimal system be adopted by the whole world? In the meantime, let us at least have the conversion tables. As regards the table of atomic weights, this has its place in all chemistry books, including *Cereal Chemistry*.

I apologise for this letter, in which I reveal to you some personal ideas only, and I trust you will believe that my sole object in writing it is the world-wide understanding between all scientific men.

I must not close without telling you that I have a great deal of sympathy with and admiration for your excellent journal.

Yours, etc.,

EDWARD E. A. MAES.

Brussels.

Herring and their Preservation

A Joint Meeting with the East Anglian Section of the Royal Institute of Chemistry with the Food Group of the Society of Chemical Industry was held on October 24 at Norwich, the subject being "Herring and their Preservation."

THE first address was given by Mr. A. E. Mallet, Secretary of the English Herring Catchers' Association, who gave some interesting details on the history of the industry. The long struggle between this country and Holland during the period of the Stuart dynasty and the Commonwealth was for the control of the North Sea, and it may justly be said that this struggle can be deemed to be the genesis of the British Navy and the Mercantile Marine.

Herring fishery was carried out at an early date, and it is probable that it commenced at Yarmouth about the year 495.

Food and Feeding Habits

The main article of food of the adult herring is the pelagic crustaceans, calanus and temora. Calanus is rich in oil, causing a marked improvement in the condition of the fish. Adult herring feed continuously in the spring, reaching a maximum in May and gradually decreasing during the summer. From October to December feeding practically ceases.

The herring fishing season lasts from eight to ten weeks, East Anglia accounting for 80 per cent. of the catch in the whole of England and Wales. Before the revolution Russia absorbed 70 per cent. of all British-cured herring and Germany and Poland took large quantities. The Russian trade was lost mainly owing to the revolution and was never regained, and (said Mr. Mallet) were it not for the supplies going to Germany the herring industry would be in a bad way today.

Turning to details of the handling of the fish, Mr. Mallet mentioned that at the date of the meeting, October 24, the herring had not yet arrived in any numbers. This was the latest date they had ever arrived and the fishermen were feeling rather worried. In any case, they had already lost two or three weeks' work.*

Curing Methods

Mr. G. T. Anderson, Lake District Fishery Officer, Ministry of Agriculture and Fisheries, then described curing methods applied to the herring of East Anglia.

Herring are salted chiefly for export. The fresh herring are taken to the curing yards and are placed in vats about 4 feet wide, sprinkled with salt, gutted, and sorted according to size into three tubs. These are emptied into receptacles called "sousing tubs" and well mixed with salt. They are afterwards carefully packed in barrels, bellies downwards, between layers of coarse hard salt, every successive row crossing at right angles to that which precedes. The barrels are then covered, turned on their sides, and rolled over every second or third day for about eight days. The salt slowly dissolves and penetrates every part of the herring. At the end of this period the barrels are opened, a hole drilled in the sides at the bilge, and the saturated brine drained off for future use. They are then topped up with more fish and salt to fill the barrels completely. These are then fastened down and turned on their sides and filled with the pickle and the hole sealed up.

Smoking of Herring

The kippering of herring was started in 1846 and in 1946 the consumption of kippers amounted to 16,000 tons.

In their preparation the fish are split, pickled in brine for fifteen minutes, and smoked over smouldering oak sawdust.

Nowadays, with the probable exception of the Isle of Man, the custom of dyeing kippers in order to abbreviate the time of smoking is universal. From a commercial point of view this is advantageous because eighteen boxes of undyed kippers would correspond to twenty-one boxes of the dyed variety, the extra quantity being made up of water. While the dyed kipper has a brighter appearance, it did not keep well, and the lecturer was strongly opposed to the practice.

In the preparation of bloaters the fresh herring are soaked in pickle and smoked over an oak-log fire for three or four hours for local trade and longer for export. Before the last war 85,000 boxes of bloaters were shipped yearly from Yarmouth.

The red herring, which had attained the dignity of a figure of speech, was a very old cure. The herring were sorted in the hold of the ship and smoked very much longer than in the case of bloaters or kippers. Red herring are prepared in Yarmouth all the year round, supplies coming from

* At the time of writing it was reported that the herring fleet had returned with 2,000,000 fish valued at £8,500.

storage vats. There was an export trade for these in Italy and Greece.

The buckling was a modification of the smoked herring. It was smoked over oak chips and practically cooked. For some reason or other it was not popular, but it had the advantage of being able to be eaten without further cooking.

Finally, fresh herring were made into Roll Mops and Bismarck herring, which are the salted fish pickled in spiced vinegar.

Visit to Lowestoft

On Saturday, October 25, the party proceeded to Lowestoft to inspect the various branches of the herring industry during the morning. Under the guidance of Captain Dunbar the landing stages were visited where drifters were landing their catches, which were speedily handled by the army of packers in the sheds. Thence the party proceeded to a curing establishment, where members saw a controlled smoke kiln for kippers devised under the auspices of the D.S.I.R.

An interesting visit was also made to a department in which drift nets were being made. These are 100 feet to 180 feet in length and about 30 feet to 40 feet in depth. The net is constructed with a mesh of 1 in. square through which the fish is able to push its head but not its body.

In another department the nets were being tanned, a mixture of Quebracho and other extracts together with bichromate being used.

The Fishery Laboratories

The meeting ended with a visit to the fishery laboratories, where the work carried out under the direction of Dr. Hodgson, chiefly on the study of marine biology applied to the practical needs of the fishing industry, was inspected.

Specimens of plankton of different types were available for microscopical examination. The significance of type and number of organisms was stressed and methods of the collation of results described.

The feeding habits of fish such as plaice are studied at the laboratories. Members were shown how the age of plaice could be deduced from the number of annual rings on the "stones" dissected from the ear.

The marking of fish with plastic discs affixed by means of silver wire, recovery of fish so marked, and their recording were described in detail. Tales were told of the practical use of the work carried out and many instances were given. Mr. Atkinson mentioned the case of a skipper who asked his advice in regard to mixed fishing, chiefly plaice; this was duly given, and a month or two later the

(*Concluded at foot of next column*)

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, November 1, 1947, page 496.

No.	*Date.* 1947.	PRICE FIXATION ORDERS
1905	Aug. 29.	Order amending the Oats (Control and Prices) (Great Britain) Order, 1947, and the Oats (Control and Prices) (Northern Ireland) Order, 1947.
1910	Sept. 1.	Macaroni and Similar Products (Control and Maximum Prices) Order, 1947. Revokes S.R. & O. 1942, Nos. 1884, 2232; 1946, No. 1565; 1947, No. 546.
1927	,, 4.	Order amending the Chocolate, Sugar Confectionery and Cocoa Products (Control and Maximum Prices) Order, 1944.
1973	,, 11.	Order amending the Butter (Control and Maximum Prices) Order, 1947.
1985	,, 12.	Oat Products (Control and Maximum Prices) Order, 1947. Revokes S.R. & O. 1945, No. 5; 1946, Nos. 510, 660; 1947, No. 1652.
1989	,, 13.	Fish (Control and Maximum Prices) Order, 1947. Revokes S.R. & O. 1946, Nos. 484, 655, 806, 1322, 1642, 2210; 1947, Nos. 957, 1316.
		FISH
2068	Sept. 23.	Order amending the White Fish (Distribution) Order, 1945.
		MUSTARD SEED.
2111	Sept. 29.	Order amending the Mustard Seed Order, 1945.
		POTATOES
2115	Sept. 30.	Potatoes (1947 Crop) (No. 2) Order, 1947. Revokes S.R. & O. 1947, Nos. 1573. 1898.

(*Concluded from preceding column*)

skipper rang up in high spirits, having loaded the biggest catch of turbot ever seen in Grimsby, at top prices, his share of the catch amounting to £500 from the trip!

The construction and functions of the two research vessels at present attached to the laboratory, together with those of a new ship designed for work in the Arctic cod waters were other items of interest.

The Control of the Concentration of Nitrite in Bacon Curing Brines

M. INGRAM, J. R. HAWTHORNE and D. P. GATHERUM

Low Temperature Research Station, Cambridge.

Part III

From the work described in Parts I and II, a perfectly clear general principle emerged, despite numerous variations in detail: low salt content in the brine leads to rapid production, and high salt content tends to cause loss of nitrite. On this basis it is possible to account for the general changes in the composition of the brine during the stages of the cycle of operations in its use.

IN the pickling operation, since the meat gains salt and loses water, the salt content of the brine as a whole is reduced, and the resulting production of nitrite causes the increase in concentration usually observed between the beginning and end of the pickling period. This production is balanced by losses in the other stages of the cycle, when the salt content has been raised, either by addition of salt, or by agitation of the salt already added.

It will be clear that this cycle of changes could take place even if there were no layering in the tank, and the following series of data (Table 14) shows that this may actually happen.

It, however, as is more frequently the case, there is layering in the pickling tank (the diluted brine rising to the surface), the same principle operates in an accentuated manner, for the surface layers of the brine are diluted much more than the average of the tank as a whole, which further increases the production of nitrite so that the overall gain as a result of pickling is greater.

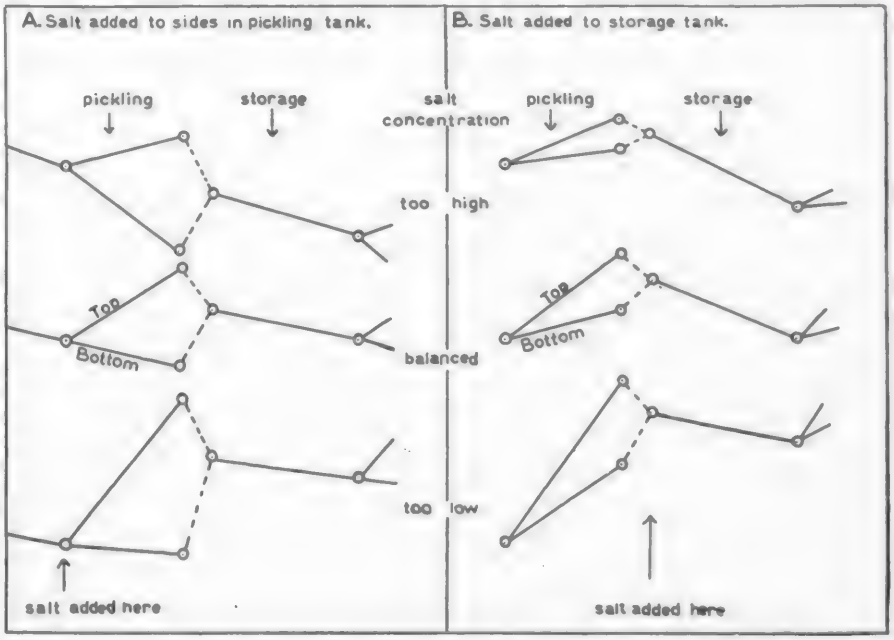


Fig. 6 — Schematic comparison of changes in nitrite concentration during one curing cycle, with two different systems of adding salt. For purposes of comparison, the scheme has been arranged to show equal rates of gain at the surface of the pickling tank and equal rates of loss in storage for the two systems. The difference between the overall changes in one curing cycle is then attributable to the difference in behaviour at the bottom of the pickling tank in the two contrasted cases.

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TABLE 14.

SALT AND NITRITE IN BACON PICKLING BRINE.

Date.	NaCl Per Cent.	KNO_2 P.p.m.
21.9.38	26·2	36
17.10	25·7	56
14.11	23·7	120
21.11	23·0	160
8 12	25·0	250
9.1.39	25·1	640
6 2	24·4	1110
20.2	25·1	1110
14.3	25·9	1030
9 5	26·8	810
5.6 ..	28·3	640
3 7	27·5	675
24.7	27·5	505
21.8	26·8	540
23.9	25·9	590
17.10	25·7	640

Date.	NaCl Per Cent.	KNO_2 P.p.m.
6 11	26·1	590
27.11	25·8	690
12.1.40	25·0	590
27.2	24·7	920
7·3	24·3	1045
9 4	24·5	800
30 4	24·7	675
15.5	25·0	620
10.6	26·7	550
27 6	27·6	490
30 7	27·1	550
13.8	26·8	490
19.9	25·9	615
9.10	25·8	675
13.11	25·9	860
28.11	25·5	920
31.41	26·5	920

No nitrite was added to this brine nor was any used in the pumping pickle. It is clear that this brine is self-regulating. It was new in September, 1938, which accounts for the low nitrite in the first few samples.

Tanks were examined for layering during three cures started 5.6.39, 11.1.40, and 16.1.40.

The results are in the table below. There is little or no evidence of layering.

	NaCl.	
Date	Top.	Bottom.
5.6.39	28·31	28·31
6.6.39	27·81	28·89
7 6.39	27·96	28·20
8.6.39	27·50	27·38
9.6.39	26·80	26·80
11.1.40	25·02	25·02
13.1.40	24·40	24·12
15.1.40	23·52	23·85
16.1.40	25·00	25·00
18.1.40	24·28	24·28
20.1 40	23·00	23·45

(Information supplied by courtesy B.F.M.R.A.)

It is instructive to compare the systems (i) when salt is added to the sides before pickling and (ii) that in which salt is only added to the brine before or during storage.

Salt Added before Pickling

In the former case the layering in the pickling tank arises from two causes: the dissolving of the salt sprinkled on the sides to give a concentrated solution which sinks to the bottom; and the removal of water from the meat to give a less dense brine which rises to the surface, and in which the formation of nitrite takes place. Although the formation of nitrite here may be relatively rapid, it is confined to top portions of the tank, while in the concentrated solution forming the lower layers some loss takes place; the data already given in Table 5 (Part I) illustrate this. In consequence, the tank as a whole is self-regulating, and the overall increase in nitrite resulting from pickling is relatively slight and can be balanced by a small loss during storage. Figures which demonstrate this are set out in Table 15.

Salt Added to Brine before or after Storage

If, on the other hand, salt were only added to the brine during storage, and none to the sides before pickling, the first of the two factors just noted would not operate. There would be no layer of concentrated brine in the tank, but the whole of the brine would be diluted and nitrite production would occur throughout its entire volume. Thus the pickling tank would not be self-regulating, and there would be a larger overall production of nitrite in it, which would have to be balanced by a corresponding loss during storage when the salt content of the brine was increased. It seems, however, that the rate at which nitrite is lost during storage is much less readily influenced by increased salt concentration than is the production of nitrite by its diminution during the pickling process; evidence supporting this view is to be found in Tables 13 (Part II) and 15. This second system of management thus tends to instability, since if over-production of nitrite occurs during pickling it is not equally rapidly destroyed during storage when the salt has been added. It should be obvious that the use of frozen sides would greatly aggravate this tendency, as it is likely to lead to excessive production of nitrite during pickling.

The differences as regards nitrite between the two systems of regulation are illustrated schematically in Fig. 6. The larger cyclic fluctuations of nitrite content with the second system of management are evident. It is true that no factory of our acquaintance uses this system in the extreme form just de-

scribed, but some approximate to it by salting the sides only slightly before pickling and making up the salt by addition to the storage tank. It is significant that it is these latter factories which are persistently troubled by over-production of nitrite, and that, in some instances, the curing of frozen pigs has led to such over-production of nitrite that the whole of the brine has had to be thrown away. So far as we can judge, it is chiefly factories with the first system of management which have been able to run the same brine for long periods of time.

Suggested Mechanism

The details of the mechanism whereby salt exerts this regulatory action on the production of nitrite have still to be elucidated, but a reasonable suggestion may be made to be tested in future investigations.

It is generally accepted that the nitrite is produced in curing brine by reduction of the nitrate of the brine by bacteria (Kerr, Marsch, Schroeder, and Boyer, 1926). The ability to reduce nitrate is a characteristic possessed in common by almost

TABLE 15.

THE EFFECT OF SALT CONCENTRATION ON CHANGES IN THE CONCENTRATION OF NITRITE DURING PICKLING AND DURING STORAGE OF BRINE, THROUGH A NUMBER OF CONSECUTIVE CURING CYCLES. THE DATA IN THIS TABLE WERE OBTAINED IN A FACTORY IN WHICH SALT IS ADDED ONLY ON THE SIDES BEFORE CURING; AND THEY SHOULD BE STUDIED AS ILLUSTRATING THE SCHEME A IN FIG. 6.

Concentration of Nitrite (P.p.m.).

Salt.		*During Pickling.*			*During Storage.*		
Per Cent.		*Initially.*	*Finally.**	*Change.*	*Initially.*	*Finally.**	*Change.*
Too high:	22·9	500	400	−100			
	23·4				400	350	−50
	22·9	350	350	0			
	22·6				350	310	−40
	22·5	310	320	+10			
	22·3				320	260	−60
	22·0	260	270	+10			
	22·0				270	240	−30
	22·2	220	200	−20			
	22·3				200	200	0
			Averages ..	−20			−36
About balanced:	21·7	200	210	+10			
	21·5				210	190	−20
	21·7	190	210	+20			
	21·7				210	190	−20
	21·5	190	230	+40			
	21·5				230	170	−60
	21·5	170	230	+60			
	21·4				230	185	−45
	21·1	195	230	+45			
	20·9				230	195	−45
	20·9	195	220	+25			
	21·3				220	190	−30
			Averages ..	+33			−37
Too low:	20·8	170	290	+120			
	20·9				290	230	−60
	20·7	230	320	+90			
	20·8				320	275	−45
	21·0	275	395	+120			
	21·0				395	400	+5
			Averages ..	+110			−33

* Final values are from mixed samples.

all the various bacteria found in normal bacon pickling brines (*Unpublished Observations M.I.*); while in nearly sterile brines hardly any nitrite at all is formed (Brooks *et al.*, 1940A). Nitrite may be removed, however, in at least three ways:

(i) It is absorbed by the meat, although the quantity removed in this way is only a fraction (very roughly one-tenth) of the total present in the brine.*

(ii) It seems very probable that some of the nitrite might be removed by oxidation by air, as normal curing brines are invariably slightly acid (*p*H about 6).

(iii) Some of the nitrite may be destroyed by further reduction by the bacteria of the brine, as some but not all of them are able to reduce nitrite as well as nitrate in culture. (*Unpublished Observations M.I.*)

The maintenance of the concentration of nitrite in the brine must depend on a balance between the rates of production and disappearance. The action of salt on these processes is still only partly known. It is known that the rate of growth of bacteria from brine is markedly reduced by increase of salt concentration in the region of 25 per cent.; but it has yet to be proved in detail that their ability to reduce nitrate is similarly affected, and little is known of the way in which salt affects the relative rates of reduction of nitrite and nitrate by these bacteria, although the figures of Table 15 suggest that the rate of destruction of nitrite may be relatively little affected by change of salt concentration. At the same time, it is unlikely that relatively small fluctuations of salt concentration have any marked effect on the absorption of nitrite by the meat, nor on its destruction by atmospheric oxidation. Thus, if in a state of equilibrium the salt concentration is increased, the production of nitrite may be diminished, while at least two of the processes removing it—absorption and oxidation—go on practically unchanged; as a result the concentration of nitrite might be expected to fall. Conversely, too little salt would greatly increase the rate of production of nitrite, without any corresponding change in the rate of its removal, leading to an increase in nitrite concentration. This suggested mechanism thus appears to offer a satisfactory explanation of the observations we have made.

It may perhaps be added in conclusion that this hypothesis is at present obviously too simple to explain every situation, and several additional factors have already been mentioned that are known to be important. Temperature, for instance, is likely to influence this effect of salt, but the way in which it does so has yet to be determined. Sometimes the relation between salt and nitrite appears to break down altogether, although it is occasionally possible to account for such anomalies; for example, in one factory it was found that no nitrite appeared in the brine even when the salt content was considerably reduced, which was eventually ascribed to the presence in the brine of unusually large numbers of bacteria able to reduce nitrite (even in this case it might have been possible to strike a balance by reducing the salt in the brine sufficiently, but practical considerations prevented this). It will be evident that much work is needed before the theoretical basis of this subject is properly understood, and that in a practical investigation a most careful control of a large number of factors is necessary if the results are to be of any value.

* It should be noted that most of the nitrite present in matured bacon is produced subsequently to the pickling of the meat, by reduction of the nitrate previously absorbed during this process (Brooks *et al.*, 1940B), so that the quantity of nitrite absorbed during pickling is substantially less than might appear at first sight.

Summary

This investigation has demonstrated a direct relation between the amount of salt used in the tank-curing of bacon and the quantity of nitrite produced in the brine.

It was shown that: (*a*) as pickling proceeds, the salt concentration in the brine as a whole falls and the nitrite concentration rises; (*b*) usually, at the bottom of the pickling tank the salt concentration is high and the nitrite concentration low, while at the top the salt is low and the nitrite high; (*c*) when there is no difference in salt concentration between the upper and lower layers of the brine, the nitrite concentration is the same; (*d*) the behaviour of the brines on storage depends on their salt-content: if it is high the nitrite disappears, if it is low the nitrite increases.

These observations suggested that too little salt causes over-production of nitrite, and too much causes nitrite to disappear, so that it is necessary to maintain the balance carefully. This was verified by a controlled factory experiment, and has been borne out during the operation of several factories over long periods.

A number of factors were indicated as influencing this relation: temperature, the amount of meat cured, and causes modifying the structure of meat before curing. It seems that the way in which the brine is replenished is of great importance, especially when dealing with frozen meat.

Finally, a mechanism is suggested which could account in principle for a relation of this kind.

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ACKNOWLEDGMENT

Clearly investigations of the nature described above could never have been carried out without the willing co-operation of the managements and personnel of the factories concerned. We wish to express our appreciation of their assistance; they prefer, however, to remain anonymous.

We are also greatly indebted to Mr. H. L. Shipp, of the British Food Manufacturers' Research Association, for helpful criticism and the provision of useful data, acknowledged in the text.

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The End of Excess Profits Tax

THE Excess Profits Tax was lowered (Finance Act (No. 2), 1945) from 100 per cent. to 60 per cent. for any chargeable accounting period beginning on or after January 1, 1946, and ended in respect of any profits in any accounting period beginning after December 31, 1946. This tax has run against profits in any accounting period beginning on or after April 1, 1939, and ending as regards profits up to December 31, 1946; any portion of a twelve months' accounting period falling before April 1, 1939, and any portion falling after December 31, 1946, does not apply in relation to this tax. The history of the tax is that up to March 31, 1940, the tax was 60 per cent., afterwards 100 per cent. up to the dates given above, and then reverting again to 60 per cent. as above.

If, after paying E.P. tax in any year, in a subsequent year the profits of a concern fall below the "standard" which for that firm determines the excess liable to tax, this difference—called a deficiency—can be claimed as a repayment of tax (if a loss has been made that amount is added to the standard in computing the deficiency). The 1945 Finance Act (No. 2) provides that no deficiency repayment will apply in respect of any deficiency occurring in any accounting period beginning on or after the first day of January, 1947.

Although the E.P. tax ended December 31, 1946, certain expenditure which may be incurred afterwards, generally called "terminal expenses," narrowed down to "costs of deferred repairs and renewals," (*a*) meaning repairs and renewals which were due to be made but could not be carried out owing to war efforts mostly superseding everything else, and (*b*) "rehabilitation costs," meaning expenses in necessary alteration to premises, removal of A.R.P. installations, returning to former localities, and so on, will be allowable. Ordinarily the costs must have been incurred before December 31, 1947, but if before March 31, 1948, a claim is made giving particulars of work required to be done, but which could not be done before December 31, 1947, this date can be extended until December 31, 1948, or even up to the end of 1949 if the Commissioners agree. Broadly, by different provisions—for both sorts of expenditure—relief is obtainable for such costs incurred any time throughout the E.P. tax periods up to December 31, 1946, or conditionally later dates as shown.

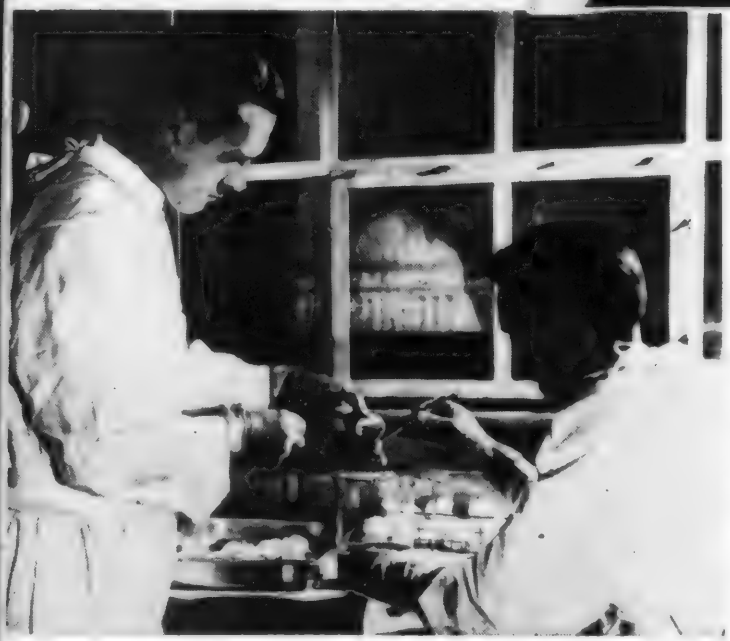
Other allowances which can be claimed are for falls in stock values as at December 31, 1946, on sales made in 1947 and 1948; on payments made in consideration of the termination of any contract (*e.g.* to war exigencies), for the supply of goods, materials, etc., or the surrender of a lease, etc.; and where a new building is erected with the former building scrapped instead of carrying out repairs, an amount estimated as to what the repairs would have cost if carried out is allowed—that is, the cost of the new building is not allowed but this estimated amount.

The Finance Acts, 1941 and 1942, provide that where E.P. tax has been paid at 100 per cent., there was to be returned a sum roughly being the difference between tax at 100 per cent. and 80 per cent., thus a rebate of 20 per cent., but this was only to be paid on condit ons, meaning broadly that the sum was to go back into the business and not be distributed to shareholders by way of dividends. The Acts provide for undertakings to be given by the taxpayers concerned to the effect that the amount of the refunds—called Post-War Refunds—will be used for developing or re-equipping the trade or business and so on—that is, put back into the business and not distributed. There is an E.P. Tax Advisory Panel established, whose chief duties are to see that the amounts are used in accordance with the provisions of the Act.

A poin to note is that as E.P. tax payments were deductible for income tax, now the amount of these refunds when made will be chargeable for income tax.

The Fight Against

Veterinary workers of the U.S. Bureau of Animal Husbandry are experimenting with a vaccine in the preparation of which the egg embryo technique is used. The required number of eggs is candled to make sure the embryos are alive.



Above: The inoculated eggs are then allowed to incubate for forty-four hours, after which the dead embryos are removed from the shell.

Above: A spot on the large end of each egg is touched with iodine and a hole is drilled through the shell at the disinfected spot, through which the embryo is inoculated with virus prepared from the organs of a chicken infected with fowl pest.

Right: The infected embryos are carefully poured into the colloid mill for grinding.

Poultry Disease

Poultry farmers are seriously concerned at the rapid and alarming rise in the incidence of fowl pest in many parts of Great Britain. In America the problem is being studied by the Bureau of Animal Husbandry of the Department of Agriculture, additional facilities having recently been provided for research on improved diagnosis. Vaccination as a method of control is also being closely investigated, and a series of practical recommendations for preventing the spread of this disease, consisting largely of sanitary procedures and the use of disinfectants, have been put forward by a national committee in the U.S.A.

Above: Research workers collect the finely ground dead embryos with their heavy load of live infective material.

Above: The vaccine base is filtered for the removal of any large particles.

Right: The base is mixed with formalin, the solution being injected into a susceptible chicken, thus stimulating the production of antibodies, which provide immunity against the disease for several months.

Canning Convention at Parma

INTERNATIONAL co-operation on a purely voluntary basis at the scientific and technical levels has been at a low ebb in Europe since the war ended. The initiative has been taken in the canning industry by the *Comité International Permanent de la Conserve*. This body was formed in Paris in 1936 on the initiative of Monsieur Pierre Peissi, Directeur-Ajoint of "OTUA" (*Office Technique pour l'Utilisation de l'Acier*), and it successfully organised the First World Congress on Canned Foods at Paris during the autumn of 1937. Early in 1946 M. Peissi ascertained that many of the former members were still interested, and he called a meeting of the *Comité* in October last year. The second meeting was in the spring of this year, and the third was held at Parma in September. The event coincided with the run of the Italian Canning Exhibition from September 7-21. This exhibition was organised by Dr. F. Emanuele (who has for many years directed the Canning Research Station at Parma), and a committee representing all sections of the Italian canning industry.

Standardisation of Can Sizes

The chair was taken by Monsieur Matherne (Belgium), and M. Peissi presented a detailed analysis of the data collected during the year from several countries upon the sizes of cans in use for particular products. A sub-committee discussed this information, and considered the basis for the standardisation of can sizes. It was agreed that volume and not weight of can contents was the practical basis, and that due regard must be paid to the shapes which are most suitable for particular packs, or which have the sanction of usage.

It was proposed that the volume of the standard can should be 850 cubic centimetres, to be designated 1/1, and other sizes would be multiples or sub-multiples of this volume. As far as practicable can diameters should be standardised and the variations in volume achieved by altering the height of the cans, since this is technically easier. The members of the *Comité* agreed to study this report intensively during the next few weeks and to talk with their colleagues in their own countries as to the practicability of effecting the maximum degree of rationalisation by purely voluntary efforts.

M. Peissi announced that he had now established relations with two branches of UNO, namely, the Food and Agricultural Organisation and the International Standards Office. Sir John Boyd Orr (FAO) had written welcoming his proposal for a full interchange of information, and M. Peissi had since met Dr. W. R. Aykroyd, the FAO's Director of Nutrition, during the August Assembly at Geneva, and he had agreed to maintain close touch.

The Secretary-General of ISO had indicated that the *Comité* could become the forum for preliminary discussions so that when these took place in their various national standards organisations, it would be known from the outset which of the proposals were likely to be acceptable.

Canned Food Research

The report on scientific questions was presented by Dr. Henri Cheftel, France's leading authority on research into canned foods. He had collated views obtained through *Comité* members as to the dearth of information on the digestibility of canned foods, and there was an urgent need for research work covering as many varieties as possible. The results should assist canners to improve their processing, and would thus be of benefit ultimately to the consumer.

Another subject on which the *Comité* ought to obtain more data was the degree of sterility requisite in canned foods. There were foods, such as salted fish and canned hams, which could be preserved quite successfully for long periods whether canned or treated by other methods, yet which were deliberately not processed to a state of perfect sterility. It was agreed that steps should be taken to see whether facilities for work on this subject could be provided in canning research laboratories of the highest repute. Members also agreed to collect data on standard methods of analysis in use among canners.

The provision of funds for the *Comité* is difficult in present circumstances, but the *Comité* has managed to carry on its work thanks considerably to the assistance of OTUA, which has provided the clerical work—not by any means inconsiderable—free of cost. A number of *Comité* members have found it possible to pay the subscription, while some others have made a proportionate donation to the funds where their own countries are not represented by nationally appointed delegates. It is hoped that as the work of the *Comité* gathers momentum a fuller and more truly international membership may come into being. In the meantime, the *Comité* is, outside of America, the only body attempting a unification of canning interests on the scientific and technical planes. The reputation of canned foods is not, and never can be, only a narrowly national interest anywhere, and it is for this reason that from the formation of the *Comité* the Tin Research Institute has given it full support.

Social History of the Pure Food Laws

F. Le GROS CLARK, M.A.

Part I

Evidence of adulteration of food in this country reaches back to the fourteenth century, and the process of reform has been slow. The control of food quality and purity will soon be legally committed into the hands of the Ministry of Food. The author reviews the growth of protective legislation up to recent times.

WHEREVER men no longer subsist entirely on the food they grow themselves and begin instead to trade in food, there is always a risk that someone will sooner or later meddle with the food in transit. He will adulterate it with foreign matter that should not be there, even if with no more than a little water; or else he will extract from it matter that should properly have remained there, such as the fats of milk. Only a few may at first indulge in practices of this kind. But if they gain a commercial advantage from them, their fellows are tempted to follow their example. The consumer then grows apprehensive; and the revenue may be defrauded. Finally laws are enacted, penalties imposed, and some effort made at supervision.

There is fairly clear evidence of adulteration in our own country from about the fourteenth century. Most of the earlier stories are of rather doubtful authenticity. Why the classical Greek and Italian writers have no more to say on the subject is not obvious; wines were apparently coloured and sophisticated in both regions; and there is some reference to crude adulteration by bakers in the first century A.D. But by the fourteenth century in our own country the millers and bakers were under suspicion; and at the same time the increasing trade in pepper and spices was an incentive to adulteration.

Early Modes of Adulteration

Grit and dust did probably contaminate the flour where the millstones were set unevenly. But considering the credulous nature of our forefathers in those times, it is remarkable how few are the recorded scares on so sensitive a subject as the quality of bread. Most of the practices mentioned in the literature were too crude to escape detection. Mouldy flour, bean meal, and so forth were, however, occasionally used in the baking; and they were sufficiently common to invite heavy penalties. Fines and the pillory (with the offending loaf hung about the neck) might follow detection; and on repeated charges the baker might be driven from the town. One regulation that we find quoted indicates that the offending baker should be "drawn on a hurdle from the guild hall to his own house through the streets where there are most people assembled and through the streets which are most dirty, the false loaf hanging from his neck." How dirty the streets might have been, and the use the assembled citizens might have made of the dirt, we can guess from contemporary records.

There is little doubt that the fairly strict laws governing the price of bread from the early thirteenth century did often tempt the baker to avoid losses by mixing mouldy flour in his dough. In the lean years that were common enough in later Tudor times, admixtures of bean and acorn meal were tacitly admitted by the authorities. A few charges were made, as in 1589, that oats, bran, and sand had been employed; but in the main the practice of bulking the flour with other edible substances was not prohibited. It is believed by some that this period saw the beginning of the use of alum to whiten the bread, though of that there seems to be but slight evidence. Unless the quantity of alum were relatively large, detection would have been rare. Permission was occasionally granted for turnips to be mixed into the flour; and orders of this kind naturally gave the bakers a hint of the various ways in which they could conveniently adulterate their wares.

By the close of the seventeenth century the growing trade in tea and coffee suggested new methods of adulteration. The occasion was not dissimilar from that earlier period, when spices and pepper had attracted some attention. At the beginning of the fourteenth century, for instance, the guild concerned had taken measures to prevent the adulteration of new stock with old and the moistening of such wares as ginger, cloves, and saffron. The sophistication of tea and coffee seems to have begun soon after their importation started on any scale. The State intervened in the first quarter of the eighteenth century. The Act affecting coffee in 1718 mentions adulteration with water and grease

and imposes a penalty of £20, which was later increased to £100. The series of Acts bearing on the trade in tea, beginning with 1723, indicates that tea was being adulterated and fabricated to an alarming extent. Mention is made of admixtures of used-up tea leaves, of sloe and liquorice leaves, and of the leaves of ash and elder. The penalties were again high for those days; they might include a fine of £10 for every pound of tea adulterated.

The Scientific Pamphleteer

The legislation that attempted to safeguard the quality of coffee and tea ran on through the eighteenth century and halfway through the nineteenth century. It was apparently the loss of revenue that influenced the authorities rather than the interest of the consumer, though as consumers themselves they could scarcely have been indifferent. By the middle of the eighteenth century, however, the problem of adulteration was at last beginning to attract the pamphleteers. One of the earliest publications (that of Joseph Manning in 1757) makes serious charges against the bakers, suggesting adulteration not merely with alum but with bone ash, chalk, whiting, and slaked lime. Manning, and most of his contemporaries, had little scientific evidence for their statements. They were usually indefinite and credulous; and their arguments are thrown into question by the more careful work of Henry Jackson, a chemist, who in 1758 asserted that bread could not have been baked as Manning believed it to have been. Jackson did, however, admit the use of alum.

Whatever the truth may have been, broadsheets and lampoons continued to plague the bakers down to the close of the Napoleonic wars. The story of chalk and plaster in the bread did not die for a full century. On the whole, scientific evidence seems to vindicate the trade, though there were presumably occasional instances of crude adulteration or criminal negligence. The practice of using alum to bleach the flour certainly increased, in spite of legislative attempts to prohibit it. The return of peace in 1815 obviously gave the signal for a fresh attack upon the problem of adulteration. It was certainly due. The science of chemistry had been advancing rapidly in the preceding quarter of a century. This increased the chances of detection; but it also increased the need for detection. Some writers have argued that the reform movement, that began in 1820, gave no proof that adulteration was worse than it had been in the eighteenth century or even earlier; it only proved that detection was growing more common. There may be some truth in this; but it is more probable that chemistry was providing the corrupt trader with the means he required for the ingenious sophistication of his wares. There had been a spread of literature on recipes and trade secrets from which the formulae for adulteration could easily be extracted, and the trader could, if he wished, become scientist in his own way and cease to rely on the primitive adulteration methods of his forebears. The analytical chemist, it has been said, was able to catch up with the increase in adulteration and finally to check it.

In 1820, Frederick Accum, a German chemist resident in this country, published his book on adulteration. He was a competent analyst; and he dealt with a number of practices, the use of alum and other matter in flour, the colouring of confectionery with poisonous substances, and the adulteration of beer. The treatise ran through four editions; but then for ten years or so the scandal was allowed to die down. Accum himself had naturally acquired enemies, and whether or not a vague charge brought against him that he had mutilated books in a public library had any substance in it, he left the country, and for the time being his exposures were discredited.

A few further books were published, some of them anonymous, but they added little to our knowledge and usually relied on Accum as their authority. The century had meanwhile seen a sequence of rather ineffectual Acts on coffee, beer, and bread. Some attempt was, for example, made to prevent the adulteration of beer with molasses, liquorice, and vitriol. But it was not until 1848 that the medical and scientific world gathered its forces for a final assault on the corrupt practices that had for several years been increasing in volume.

The Work of Wakley and Hassall

In that year most of Accum's charges were formally repeated by John Mitchell. Milk was being adulterated with chalk and flour, cider contaminated with lead, flour adulterated with alum and pipeclay. But this was merely the prelude to the *Lancet* campaign of 1850 and the years that followed. Thomas Wakley, the founder of the *Lancet*, was still its editor. He had by that time sat for many years in the House, where his zeal as a reformer made him one of the conspicuous figures of his age. He died in 1862; but his last campaign was among his greatest. In 1851 he decided to institute a *Lancet* commission and to publish the results of chemical and microscopic analyses of foods in common use. Not only was their composition to be thoroughly investigated, but if the traders from whom adulterated samples were purchased did not give up their fraudulent practices, their names were to be made public.

Wakley's chief agent in the work was Dr. Arthur Hassall, with the assistance of Henry Letheby, a lecturer in chemistry at London Hospital. Hassall

had great competence with the microscope, and could supervise the engravings that illustrated the articles published under his name. The first of these articles, on the adulteration of coffee, appeared in 1851, and for the next four years, while the Great Exhibition and the Crimean war ran their course, the articles followed one another. In 1855 they were gathered into the volume *Food and its Adulteration*.

The exposures were effective From the start the Press publicised them and remarked on the need for legislation. *Punch* featured a series of satirical articles supporting this new "scientific detective police." The public interest did not die away; it had no chance of doing so. Even Tennyson in the mid 'fifties was still complaining that

> Chalk and alum and plaster are sold to the poor for bread,
> And the spirit of murder works in the very means of life.

No doubt the public and the poets alike acquired an exaggerated notion of the extent of the evil, but it was serious enough. By Hassall's findings at least half the samples of milk examined had been diluted with water; out of thirty-six samples of sugar all were adulterated in some measure, a few with lime, lead, and sawdust. Every sample of mustard contained flour and turmeric, while bread was in every case contaminated with alum. More than three-quarters of the fifty-six cocoa samples contained added starch. As for tea, it presented as unsavoury a picture as any that had been indicated by the Acts of the eighteenth century. Not only was much of it treated with indigo, black lead, and mica, but it was apparently quite a common practice to doctor used tea leaves with gum and sulphate of iron, add sloe or bay leaves, and sell the mixture as finely blended tea.

The case of sweets is interesting, because there were at the time records of the poisoning of children with almond flavour and with various metallic substances in the colouring matter. Hassall's analysis of over a hundred samples gave fifty-nine as containing lead chromate, twelve red lead, eleven gamboge, eleven Prussian blue, nine copper arsenite, and so forth. *Punch* was quick to seize upon the implications with a reference to "the confectioner imp, who paints cakes with emerald green and, especially in holiday-time, plays Herod among the innocents." But pepper was less subject to adulteration in the 'fifties than it had previously been, and the reason of this gave Wakley one of his strongest arguments. Pepper had engaged the close attention of the excise authorities, and if inspection could check the scandal at one point, methods of control could certainly be devised for the rest of the common articles of food.

The work done by the *Lancet* was sufficient for a period to reduce the incidence of adulteration; by 1858 food adulteration was scarcely 10 per cent. of what it had been in 1851. So at least Wakley and his associates were led to believe. But there was no evidence that this would last. Indeed, in 1855 a Select Parliamentary Committee had been appointed to consider adulteration, and it was clear that legislation was required. How far frauds of this kind were really being practised and how injurious they were to health it is not easy to determine at this distance of time. They were commoner in the large cities than in the villages, but much less common in the provinces than in London. As a whole, the public was cheated rather than poisoned. Yet Hassall's figures are impressive, and in any case the quality of much of the food retailed was obviously poor enough without being diluted and sophisticated to this extent.

The Act of 1860

It is of no interest here to list the series of Acts that for seventy years followed the passing of the first inclusive law on the subject in 1860. For the fifteen years to 1875 the new regulations were not applied with any degree of conviction. The 1860 Act was well meant but weakly drafted. It gave powers to various authorities to appoint analysts. But in those days there were not many competent analysts, and partly for that reason, because appointment was in the hands of men who might occasionally be suspected of some bias, very few analysts were employed. There was a total lack of accepted standards, and this naturally made the analysts hesitant in matters that would have to be submitted to a court of law. Only in Dublin, in fact, does the Act seem to have been applied with any measure of success.

A beginning had, however, been made, and an amending Act in 1872 drastically revised the penalties and gave more precision to the description of offences. It widened the powers of appointment and, what was perhaps most important, it re-defined the measures that might be taken for securing samples for analysis. The legal status of the analyst was now better assured than it had previously been. In 1874 a few of the leading analysts took the obvious step of establishing a Society of Public Analysts, and this Society has not merely given legal protection to its members, but has played a leading part in the definition of the standards of food adulteration and in the promotion of chemical research. Patently, before the law could be effectively administered, a new professional type had to be created, a cross between the research worker and the civil servant.

(*To be continued*)

Nutritional Requirements of Man

The planning of the country's food requirements during the War tested nutrition theories, said Sir Jack Drummond opening his Gluckstein Memorial Lecture to the Royal Institute of Chemistry. His subject was "Nutritional Requirements of Man in the Light of War-Time Experience." The test showed that there were no major flaws in the theories, but only small gaps which called for a little more knowledge and some adjustment.

THE basic human requirement is of course energy. There is a large literature giving typical figures for various social groups. For national planning, however, overall figures are needed; and the choice of these figures is difficult, due to the wide spread of individual requirements. Even within any one population category great variations occur. For instance, adolescent boys were found to have daily needs varying between 1,600 and 4,900 Calories.

Two particularly important overall estimates have been made. The League of Nations pre-war estimated 2,980 and the National Research Council of U.S.A. 2,550. This discrepancy represents for Britain two million tons of wheat per annum, a figure which underlines the seriousness of the decisions called for. It was decided to base our estimates on a target of 2,900 Calories, providing a probable intake of 2,600.

European Relief Plans

For European relief immediately after liberation it was decided to aim at 2,000 Calories as a quantity which prevents actual starvation, although it scarcely permits continuous physical work. Nominal rations in the first areas liberated were below 1,500, yet people showed no signs of under-nourishment. This apparent refutation of the nutritionists' theories stimulated the military authorities to challenge the basis of the supply calculations. The answer, of course, lay in the fact that returns made to the Germans of quantities grown and stocked represented only about half of the true figures. Secret food stocks and the Black Market brought up the actual food intake to much greater amounts.

In Western Holland in 1944-1945 only 1,500 Calories were in fact consumed, without any available supplement. The tragic condition of these unfortunate people confirmed results previously obtained on volunteers in experiments on controlled-calorie diets. Even more pitiful was the condition of the Nazis' concentration camp victims on their 700-800 Calories.

In planning for the needs of a nation at war engaged on hard work, it is important to have a "buffer of energy." This was met by unrationed bread and potatoes giving people a choice in filling their varying energy requirements.

Distribution of the food intake during the day—the "meal pattern"—is of importance. Well-spaced meals minimise fatigue. Some empirically developed practices are very good—for instance, six to seven meals a day in some areas. This problem needs more study, but enough is known to condemn the practice in some industries of forbidding meals during shifts.

Fats

The amount of fat essential for good health is unknown and great controversy exists around the question. It is, of course, the most compact form of energy; it gives a feeling of satiety due to its slow passage from the stomach and adds a tasty flavour to other foods. Deficiency diseases associated with it have never been conclusively described in human beings. Brussels school children, suffering from skin scaliness attributed to fat deficiency, recovered equally well on fat-free and fat-containing diets. People in the Netherlands East Indies normally have 5 g. per day in their diet, although the average for England is near 100.

More important than physiological questions connected with fats are probably national habits and conventions. The effect on morale, rather than body, is likely to determine the safe minimum for a country.

Protein

The literature dealing with protein requirements is massive and reveals the existence of a great controversy. One school advocates a low protein diet, using only one ounce per day to repair the wear and tear of the body. Another links physical well-being with a rich protein diet.

In passing, it may be noted that it is not justified to describe bread as only starch. With its 8 per cent. of protein, it is the cheapest source of the latter food factor.

Work on the isolation of the constituent amino acids from proteins is well advanced. Ten essential amino acids in small quantities have been found to suffice to meet the body's needs of nitrogen. Today, more is known about protein formation in the body. The proteins of food, body reserve, tissue, and blood form an integrated dynamic system in perpetual flow. Nitrogen isotopes have been used in elucidating this system. It is possible that in a year or two it will be possible to state body-building needs in quantities of essential amino acids rather than as "protein."

A fall in protein intake causes a gradual failure to make it in the body. Blood (albumen) protein falls. Anaemia occurs among women, children, and adolescents, even when provided with adequate iron. Regeneration from this condition takes only four hours after adequate protein is supplied.

Hunger oedema—that is, swelling due to accumulation of liquid in the tissues—occurs at intakes of about 1,400 Calories and 35 g. of protein or less. Again the only places seriously affected were Western Holland and the German concentration camps. Studies of this condition indicated that the lowering of cell permeability was not correlated with the blood protein level. Other factors must therefore play a role.

It had previously been thought that the digestive track ceases to function and secretions fail under conditions of starvation. Predigested foods were therefore supplied by mouth, nose, parenterally or intravenously. As noted in FOOD MANUFACTURE (May, 1947, p. 213), results in Western Europe showed no advantage in the use of protein hydrolysate. If patients were at all capable of recovery, they did so on ordinary milky foods. Below a certain level of vitality no measures could save them and the unfortunate victims died.

Very important was the discovery that there is a heavy drain of protein from the body, by excretion, after shock. As much as 200 g. nitrogen (corresponding to 1·5 k. protein) was lost in three weeks. Canadians met the implications of this by supplying high protein diets to their hospital patients. Much more rapid recoveries were obtained. English hospital diets, unfortunately, show very little recognition of this factor, and their diets —among other nutritional defects—are lacking in this respect.

Vitamin C

All the estimates made at the beginning of the war proved to be satisfactory or high. They were all on the safe side. For instance, the League of Nations estimate was 30 mg. for vitamin C requirement, while the American one was 75 mg.—with higher figures for the period of pregnancy. The Ministry of Food aimed for 75 mg. and hoped to achieve 30 mg. For a long period they were down to 10 mg., but no evidence of deficiencies occurred. Dundee boys—in an earlier investigation—were shown to have available not more than 19 mg. in uncooked food, and hence less than 10 mg. as intake. Yet here, too, no deficiency condition occurred.

It is, therefore, likely that 10 to 30 mg. per day is adequate, and there is no evidence of benefit in greater quantities. The most useful source is potatoes, and the curves for vitamin C available regularly show a marked peak in May and June as new potatoes come on the market.

Vitamin A

Intake of vitamin A increased during the war. This was true, surprisingly enough, even of the poorly fed occupied countries. The first clues which led to this unexpected discovery came from investigations on the working-class population of beleaguered Madrid during the Spanish War, Spanish and other scientists conducted "model experiments" on groups of this under-fed community and found that, under conditions of calorie deficiency, much more whole-corn food and vegetables is eaten. People, therefore, do not suffer from vitamin deficiency, although they may be a little low on minerals.

Vitamin B

These important conclusions guided the nutritionists planning food relief in the wake of the liberating armies. No vitamin preparations were provided for the general population, and concentration was made on the other food factors.

Vitamin B_1 available increased as the flour extraction was increased.

Calcium intake showed a sharp rise in 1943, when fortification of flour was introduced.

Regular Surveys

Regular surveys have been conducted by the Ministry of Food and the results published. These may be said generally to have confirmed previous dietary knowledge. In consequence, the health of the nation, overall, did not deteriorate during the war.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

Quick Freezing at Sea

Quick freezing on board ship, ensuring that the fish is frozen at a stage of perfection not possible where land factory freezing is used, has been an obvious development in the quick freezing of fish. After the surmounting of a number of difficulties, the first quick freeze factory ship has been launched.

The *Fairfree*, ex-Algerine-class minesweeper, built in Toronto in 1944, of 1,300 tons gross, whose conversion has been completed at Ardrossan, is the first British ship to incorporate quick freezing facilities and is consequently a prototype on whose successful operation the future construction of such ships may depend.

OPERATED by Fresh Frozen Foods, Ltd., the *Fairfree* incorporates many new ideas patented by Sir Dennis Burney, Bt., C.M.G., chairman of the company, Sir James Lithgow, the shipbuilder, and Lord Woolton associating themselves with Sir Dennis in the developments.

Provision of Special Gear

A survey of the ship at Ardrossan revealed that the need to provide more space for additional crew, refrigeration equipment, and hold space, required the adoption of stern handling of nets instead of the normal side handling general in the trawling industry, where low-sided vessels have been standard. This made the normal trawling and otter gear unsuitable and demanded the creation of special gear designed to allow stern work.

Paravanes, invented by Sir Dennis, have been adapted to allow their use as otters. Resembling miniature yacht hulls, the new type "para-otters" give a degree of stability and buoyancy in use not possessed by the otter. Of aluminium construction, this equipment is connected to twin trawl nets by towing wires. The otters stream out at an angle of nearly 60° when shot and give the twin towing nets a spread of 100 ft. as against the normal 50 ft. on the largest trawlers, with a depth of some 12 ft. against the normal 2 ft. The sweeping rectangle is thus extended to some 1,200 sq. ft., or ten times more than that of the largest existing net. The trawl nets have four feeds, each with a capacity of 3 tons of white fish, giving a total capacity of 12 tons in each of the two trawl nets. These are shot over a whale back in the stern and are returned in the same way; an interesting point being that the para-otters can be disconnected and streamed while the nets are being hauled, thus avoiding the need to draw the otters in on each occasion.

The "Fairfree" showing the new type stern with para-otters in position.

Labour Economy

Tests have shown that the catch of fish increases in relation to the increased net opening height. For this alone the present development would be noteworthy, but there is the added fact that the trawling process has been semi-mechanised and that

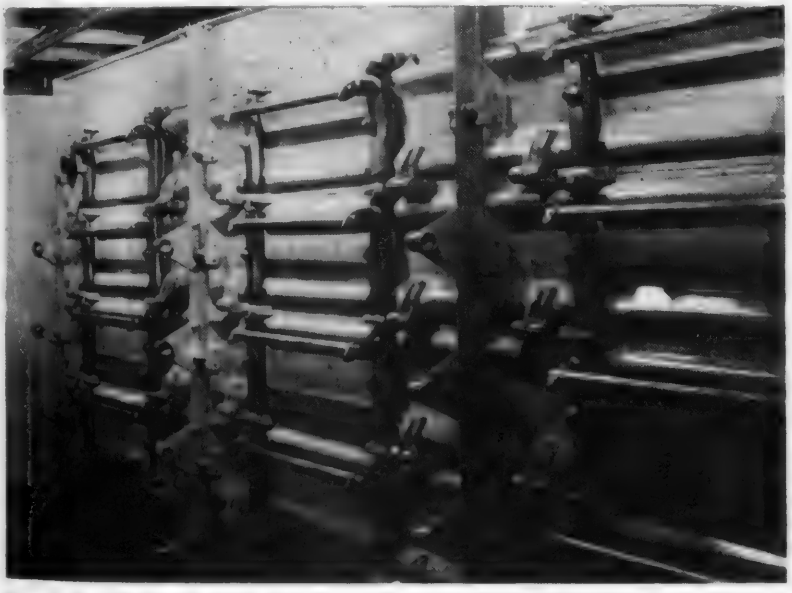
much of the manual labour involved in trawling will be ultimately eliminated. The labour required to handle the *Fairfree* nets is about half that required for any comparable work in a normal trawler.

Above the stern whaleback is a small bridge, mounted with searchlights, for lookout work and paravane control. A gangwalk surrounds the central working space, net space, and the deck shoot, down which the fish is tipped as the nets are brought in.

This shoot delivers the catch into a partitioned box on the deck below where a team of filleters work. While machine filleting is expected as a later development, present policy will be to fillet by hand, the men working at well-lit work benches of galvanised steel and timber. Adjoining these are washing baths, salt boxes, and more benches.

Aluminium trays, 1½ in. deep, are used to store the filleted fish, the trays being so designed as to allow partitioning to accommodate various sizes of fish. The use of angled aluminium sections provides smaller compartments giving the domestic size of pack, larger packs for commercial disposal being also planned. These trays are then stored in a storage rack, carrying 100 trays, adjoining the Burney freezer, which is located on this deck.

Para-otters over the trawler's stern, over which otters and nets are shot and drawn.



Exterior of the Burney quick freeze unit showing the quick action door clamps.

The Burney Freezer

An aluminium, all-enclosed, side-feed unit with twelve doors, three divisions, and thirty-two trays to a division, the freezer gives a total capacity of ninety-six trays. Insulation is 2 in. to 4 in. of Onazote on a bed of 4 in. Onazote, thermocouples being used to give distant recording. Blocks of

fillets packed in this freezer are approximately 2 lb., output being 1 ton per hour, whole or filleted. Doors are sealed internally with a special rubber-type material and fitted with a locking device to clamp doors easily and firmly.

Doors to the various units are long and narrow, giving access to four trays each, with bottom hinges and special balancing clamps to limit loss of freezing time. Shelves are of thirty-two parallel tubes of 1 in. bore at 1¾ in. centres. Linked to the brine supply, these have a system of fins which give a flat freezing plate upon which the trays rest. In other designs the trays rest on the fin tips. The centrifugal fan is a thermotank unit giving a flow of 24 ft. per second, baffled to ensure that the circuit flows over each of the rows of containers.

On the deck below are two complete units, to which brine is brought to −30° F. to reduce the fish to −20° F. The whole unit has been devised to ensure continuity of operation whatever emergencies may arise.

The frozen blocks are packed in Cellophane by means of an ingenious device consisting of a long board on which a metal scoop has been located, the see-through wrap being placed over this scoop and the block slipped easily into the open mouth. The pack is then heat-sealed by a device at the end of the bench and packed into 42 lb. fibreboard cartons. These are transferred to a gravity-roller system which leads to a spiral chute ending in the fish hold. Larger packs for commercial use will be packed in hessian bags.

Designed and patented by Sir Dennis, the hold is held at −10° F. by brine coils of 2 in. bore, while Onazote is used for insulation purposes. It is divided by bulkhead frames which allow loading at a low level until the entire low level space has been filled and cross-braces fixed in position across the bulkhead gangways to hold the packs tight. When this low level has been filled, a section of the spiral chute is adjusted and delivery taken at a higher doorway, the lower level packs providing a floor for the workers packing the upper levels of the fish hold.

Carrying a crew of forty, the *Fairfree* will take experts on the first few trips to study the successful operation of the various units. With a speed of approximately 10 knots, the ship is fitted with radar and will use other modern scientific instruments developed to assist the fishing industry.

SUPPLIERS OF EQUIPMENT

Freezing units: *L. Sterne and Co., Ltd., and J. and E. Hall, Ltd.*
Evaporator: *Mechans, Ltd.*
Compressors: *J. and E. Hall, Ltd.*
Steam-driven unit: *Belliss and Morcom, Ltd.*

Standard Bakery Equipment

THE case for the standardisation of plant was put forward at an open meeting of bakers and allied traders organised by the Bakery Trade Executive's Guild in London. A resolution was carried which recommended to the British Bakery Industries Research Association that they co-operate with the British Standards Institution in exploring the possibility of preparing standards in the bakery industry.

The Guild had had standardisation in mind for some years, but it was of particular importance at the present time when output in this country had to be increased by 180 per cent., and this applied just as much to bakers as to anyone else.

Examples were given of difficulties and waste arising from the lack of standardised articles such as when a wrong-sized tray was put in the rack. Manufacturers had said that over 50 per cent. of the orders are not standard and have to be made to measure. If a sufficient run were made of standard head tins, the cost would be under half.

The British Standards Institution could provide machinery which the baking industry could use to find the answer to their own problems, said Mr. G. Weston, one of the directors. The standards, when issued, were not mandatory and carried no legal force. They existed as a document containing the objectives to which an industry wanted to work.

Dr. J. B. M. Coppock, director of research of the British Baking Industries Research Association, said that they had had the idea of specifications for the industry in mind for some time, and would co-operate in every way in producing specifications. Standards would help the small man. It was very important that a lead should come from within the industry and not as a result of Government pressure.

Dr. Francis Aylward, head of the National Bakery School, also stressed the help that standardisation would give to the small man more than to the case of big firms, which adopted standardisation automatically in their own organisation. Standards should be minimum standards which people could add to and improve, and there should be a sufficient variety to allow individuality and initiative.

NOTICE

ORDERS for any of the books reviewed in this issue may be placed with the Books Department, FOOD MANUFACTURE, 17, Stratford Place, London, W.1. It is regretted that under present conditions it is not always possible to supply books by return of post.

Cost Accounting in the Food Industry

HARRY DUGDALE, A.L.A.A., A.C.W.A.

Part I

The last two decades have seen scientific management progressively permeating into all branches of British industry, and not least of all into the food manufacturing industries.

Scientific management has several constituent elements, among which cost accounting ranks of great importance, and, in fact, is now firmly recognised as a highly essential tool of management.

THE reasons for the increasing recognition accorded to cost accounting are not far to seek; properly practised it provides management with the following information:

1. The current cost—in terms of labour, materials, and overhead charges—of all manufacturing operations.
2. Detailed departmental statistics of that all-important indice "production-per-man-hour."
3. Standard costs, formulated from studies made in the factory, of each process, showing what the cost should be if a standard usage of material is processed in a normal standard time with plant facilities being utilised up to their normal achievable potential.
4. Comparisons between standard and actual costs, decisively portraying variations from standard and explaining the "make-up" of such variations.
5. Budgeted estimates of the expected income and expenditure for the financial year broken down departmentally; and, with regard to expenditure, assigning responsibility to departmental executives for budget-achievement.
6. The bases on which suitable modes of incentive bonus schemes may be instituted to reduce production costs synonymous with an increase in employees' earnings.
7. Details of production losses; their quantitative and sterling amounts; their departmental and/or process incidence; and—arising out of such data—the overhauling of production methods to ensure the eradication of avoidable waste.

The foregoing is a concise but by no means exhaustive list of the service provided to management by an efficient cost accounting system; and the *modus operandi* thereof, in the food manufacturing industry, will be examined in this series of articles.

Installation of a Costing System

The installation of a costing system is no simple matter. Much thought on the part of the Cost Accountant must precede the actual institution of costing procedure, for forms of record have to be devised, factory organisation and processing routine closely studied, and the co-operation of departmental executives obtained. This latter in itself often demands considerable tact and perseverance, for departmental managers may have to be educated to perceive that cost accounting is not some form of Gestapo system aimed solely at depicting their departments' weaknesses but a means whereby they can achieve more economic output. For such reasons, when a costing system is being installed, the management must allow the Cost Accountant a reasonable period of time in which to devise an effective system. In the author's experience, even after several years one can constantly effect improvements and make innovations in an established system.

Viewed broadly, the cost of food manufacture may be broken down into the following constituent parts:

(*a*) Materials' cost.
(*b*) Direct labour cost.
(*c*) Factory overheads.
(*d*) Administrative overheads.
(*e*) Selling and distributive overheads.

In the food manufacturing industry it is necessary constantly to bear in mind that the cost of the finished product in its saleable form will include not merely the cost of the contents but also the cost of the various types of container. It is important, therefore, that where the factory has its own container manufacturing department, these operations should be regularly costed to ensure maximum economy in production. Packing costs also loom large and must be effectively controlled.

The Purchasing Department

The organisation relating to manufacturing materials commences in the Purchasing department. It is essential that this department has adequate records of the names, etc., of suppliers of all materials used in the factory (*i.e.* not merely product materials, but also maintenance items); of the periods requisite for delivery; of prices and quotations (bearing in mind the possible economies—in normal times—accruing from the placing of forward contracts for bulk-puchases); of full specifications—supplied by technical and laboratory staff—of materials; of suitable alternatives where first-choice materials are not available.

Efficient purchase order routine may be established on the following lines. The essential data *re* the goods being ordered are typed on a sextuplicate set of forms, which are then distributed as follows: one copy sent to supplier, two copies to storekeeper, one copy to Cost Accountant, one copy to Production Planning department, and the sixth copy retained in the Purchasing department.

Each set of order forms must be numbered consecutively, and suppliers must be requested to state such order numbers on delivery notes and invoices. This ensures a quick "tie-up" of documents when the goods are delivered to the factory. The order forms should also show the expected date of delivery, thus enabling the Purchasing department to maintain a close check on the important factor of prompt delivery.

When the materials arrive at the factory they are taken to the Receiving Stores and checked against the delivery notes and copy purchase orders. If correct, the storekeeper states this fact on the purchase orders, and forwards one copy of such to the Purchasing department (retaining on his file the other copy and the Delivery Note). The Purchasing department is now able to pass the invoices for payment; and the accounting routine must be so organised that the invoices travel smoothly through the Purchase Ledger section to the Cost Accountant's department, where the details are duly recorded in the Stores Ledger Accounts. If any delivery does not "tie-up" with the details shown on copy Purchase Order, *e.g.* short weight, wrong specification, breakages in transit, etc., the variations are noted, on the Purchase Order, by the storekeeper. This procedure enables the Purchasing department immediately to make the necessary representations to the suppliers. The materials in question are placed in the "pending" section of the Receiving Stores and remain there until instructions are received as to their subsequent treatment.

It is germane here to consider briefly some of the main points of store-room organisation. The Receiving Store (assuming there are several stores in the factory area) should be located near the factory gates, thus facilitating the entry of suppliers' lorries; it should be equipped with a spacious loading stage, and a specific section of this store should be utilised for goods held pending claims and/or enquiries, as already described above. Where there is only one store serving the entire needs of the factory, however, then the factor of accessibility to the manufacturing departments *vis-à-vis* the factor of adjacency to the factory's gates must be carefully considered. In these circumstances the store requires to be positioned near the focal point of manufacturing operations. Special refrigerating rooms are required in many food manufacturing factories; where possible these, too, must be placed near the scene of production. Moreover, a strict and continuous inspection must take place to ensure the continued efficiency of the refrigerating plant.

Decentralisation of Store Rooms

In recent years modern production planning has appreciated the benefits accruing from a decentralisation of store rooms. This *modus operandi*—which, although easily incorporated into the plan of a new factory, can often be only partially applied in the case of an existing one—is usually on the following lines: (*a*) there is a Receiving Store, and (*b*) there is a series of sub-stores, each linked with its relevant manufacturing department and stocking the materials required in that department, and (*c*) there is a Finished Goods Store located near the Packing department. Efficient storekeeping is synonymous with effective stores lay-out; materials should, where possible, be kept in storage bins, with the latter arranged according to the classification codes of the materials. Each bin is numbered, and a key-plan of the stores lay-out should be in the storekeeper's hands to facilitate the prompt finding of materials when the latter are requisitioned by the manufacturing departments. The area of the stores should contain a wide central aisle with passages—to the storage bins—running at right angles therefrom, all such passages being sufficiently wide to allow for the unimpeded entry of jack-trucks. To each receptacle of material should be attached a bin-card—ruled as shown below—which is, in other words, a continuous stock record of the bin's contents.

A few considerations arise from a survey of the above bin-card. The data *re* maximum and minimum stocks, and re-order level, require careful formulation. Pertinent factors as regards maximum stocks are (1) storage space available; (2) the keeping characteristics of the material; (3) financial economies resultant upon bulk-purchase; (4) the projected production of "lines" requiring the material. With reference to minimum stock data,

BIN-CARD.

Description of Material: | Code Classification: | Bin No.:
Maximum Stock: | Minimum Stock: | Re-Order Level:

Received.			Issued.			Balance.		Routine Physical Check.		Currently on Order.	
Date.	*Purchase Order No.*	*Quantity.*	*Date.*	*Requisition Note No.*	*Quantity.*	*Date.*	*Quantity.*	*Date.*	*Quantity.*	*Date.*	*Quantity.*

this is formulated from rate of consumption in conjunction with time required by suppliers in effecting deliveries, and the re-order level is fixed at a quantity somewhat higher than the minimum level and thus acts as a precautionary factor. Obviously such data must be considered in the light of the specific circumstances of each factory.

The bin-cards should be written up daily by the storekeeping staff, and the balance on each recorded. These balances are then tested by means of a periodical physical check known as a perpetual inventory. This latter is organised on the following lines: the management decides, for example, that each item of stock must be tested four times per annum; if, therefore, there are 100 kinds of material stored the total annual tests of stock balances will be 400 (*i.e.* 100 × 4), or approximately eight items to be tested weekly. This test check may be carried out by the storekeeper under the supervision of the Materials' Clerk from the Cost Accountant's department, and the results thereof are recorded in the appropriate column of the bin-card. Subsequently to this a report is forwarded to the Cost Accountant showing discrepancies of physical stocks as compared with notional stocks per bin-card. Such discrepancies must obviously be investigated immediately and the causatory reasons elicited, steps being taken to reduce or eradicate such discrepancies in the future. The final column of the bin-card is chiefly a "memory-tickler": indicated therein are the data *re* quantity of goods on order; and, if such goods are not received on the due date, this column provides an additional check to that incorporated into the routine of the Purchasing department.

Cost accounting of materials usage is achieved by an efficient system of stores accounts, requisition notes, and short-term analyses of such data. A stores ledger must be opened with a page assigned to each specific type of material used in the factory. To avoid constant repetition of descriptions of material on requisition notes and analyses the Cost Accountant should prepare a classified schedule of materials on what is known as the "standing order-number" principle. The schedule cites a full description of the material and its relevant S/O (*i.e.* "standing order") number, thus:

Description.	*S/O Number.*
Butter Fat	B.F. 1

When this material is required for production it will be requisitioned as B.F. 1. Copies of the S/O number schedule (which, in addition to dealing with materials, also classifies processing operations, maintenance work, power and steam services, and units of plant equipment) must be in the hands of all employees who prepare requisition notes, and an enlarged version, for general use, should be exhibited in a prominent place in each department.

Assuming for the moment that mechanised accountancy is not resorted to, the Stores Ledger Accounts should have the format shown below.

Requisition Notes

All materials required for food manufacture must be obtained from the stores on the presentation to storekeeper of requisition notes showing: date, process for which required, S/O number of material, batch number. An interesting feature of the application of this system in food manufacturing concerns is the requisitioning of materials according to a predetermined recipe or formula. Scheduled quantities of materials, in accordance with various sizes of batch, will be formulated, and —when the materials are being requisitioned from stores—it is merely necessary to state on the requisition note: standard quantities for batch size No. 1,

STORES LEDGER.

Description of Material: | Maximum Stock:
Code Classification: | Minimum Stock:
Re-Order Level:

Price Data.
Average Price. do. do. do. | *Date Computed.* do. do. do.

Received.						Issued.				Balance.			Physical Stocks as Ascertained by Perpetual Inventory.	
Date	*Inv No.*	*Supplier*	*Qty.*	*Price*	*£ s. d.*	*Date*	*Analysis Materials No.*	*Qty.*	*£ s. d.*	*Date*	*Quantity*	*Remarks*	*Date*	*Quantity*	*Variation from Book Stock*

in accordance with recipe No. 23. The recipe cards will not, of course, be left in the stores permanently; their proper venue is the Planning department, but the cards currently applicable can be forwarded to the storekeeper as and when required. Such procedure obviates much written work on requisition notes.

The requisition notes, arranged in booklet form, and providing carbon copies, must be consecutively numbered. A record of the whereabouts of each set of notes must be retained in the Cost Accountant's department. Requisition notes passed into the stores are forwarded by the storekeeper to the Materials Clerk in the Cost Accountant's department, and all consecutive numbers of such notes must be accounted for as a matter of day-to-day routine. This procedure establishes that, in fact, all requisition notes are received in the Cost section.

In the hands of the Cost Accountant's staff the requisition notes are priced and the sterling amount of each issue obtained. Policy with regard to the pricing of requisitions varies, but in Britain it is usually on one of the following bases:

(*a*) *First in: First out.*—This method assumes that materials are used in factory processing in the order in which they were delivered to the factory. Hence the prices applicable to any one material are used, in their date-sequential order, in the pricing of requisition notes. For example, if the first delivery in the year is at £4 per ton, and the second delivery at £5 per ton, then the rate of £4 per ton will be applied to materials' requisition notes until the quantity comprised in the first delivery has been consumed in production, when the next batch will be priced at £5 per ton, and so on.

(*b*) *The Average Price.*—This basis of pricing materials' requisitions is now widely used in the cost accounting of food manufacture. The underlying principle is that the cost of each delivery to the factory is averaged with the value of that quantity of the former delivery which remains in stock at the date of the new delivery. For example, if 1 ton is in stock (and its purchase price was £4 per ton) and a new supply of 5 tons is received (at a purchase price of £5 per ton) the average price is computed thus:

1 × £4 = £4
5 × £5 = £25
6 tons cost £29 = £4 16s. 8d. per ton.

The evaluated requisition notes are then analysed, according to the code classifications of materials, on analysis sheets, which are totalled at monthly intervals and thus provide the medium for posting Stores Ledger Accounts. A further analysis is required of the amounts chargeable to each process. This necessity arises because the Cost Accountant requires one set of data for the Stores Ledger Accounts, and a reshuffling of the same basic data for the Cost Accounts. However, this multiplicity of analytical functions (which is inherent in cost accounting) is rapidly dealt with, in practice, where punched-card accounting machinery is used.

It is convenient to mark those Stores Ledger Accounts relating to materials which form the subject of returns, at monthly intervals, to the Ministry of Food. Such accounts may be then grouped together, in a specific section of the stores ledger and thus facilitate the speedy preparation of Ministry of Food returns.

Recording of Finished Goods

No cost accounting system is complete—as regards the stores routine—which fails to make proper provision for the accurate recording of the finished goods as they come off the packing lines. In this respect the author has found the following procedure most useful.

The Packing department completes a daily return showing date, description of "lines" packed, quantities effectively packed, quantities rejected after inspection, with reason for the rejection. This return is additional to the daily time-sheets prepared by packing operatives (to be described later) and is forwarded to the Cost Accountant's department. The quantities effectively packed are transported to the Finished Goods Store, accompanied by a transfer note (of which a copy goes to the Cost Accountant) showing details of date, "lines," and quantities involved. These transfer notes are used as the basis of posting the finished goods stock accounts. It is obvious that the day's effective packed output must agree with the quantity transferred—as shown by the transfer note—to the Finished Goods Store; and the routine advocated is a certain check against defalcations, provided the daily packing return is consistently compared with the transfer notes.

Finally, when the Invoicing department is engaged on the routine of invoicing deliveries to customers the stationery used should provide for, *inter alia*, a carbon copy, which is forwarded—as a requisition note—to the Finished Goods Store, as the authority for and record of goods withdrawn from that store for despatch to customers. A similar copy, sent to the Cost Accountant's department, enables the requisite credits to be posted to the Finished Goods Stock Accounts. It cannot be too strongly emphasised that close control must thus be effected, not over merely the raw materials of the food manufacturing processes, but also the finished products, in order that loss through defalcation may be reduced to a minimum.

(*To be continued*)

Year Books

UNTIL about ten years ago most of us would have looked upon an industrial reference book as mainly a technical book, a kind of encyclopaedia of new and old facts. With the changing pattern of industry, and, indeed, of all kinds of human organisation, a new type of reference book becomes more necessary—the guide book type, the "enquire within" portfolio that lists the specialised societies, the State departments, the business associations, the research groups, and so on. This kind of function is discharged by two year books,* each now again available in a 1947 edition. It is difficult to assess their true value, for this depends upon the reader's needs, but one can imagine that some will find one or other of these year books a utility mine of information; for others, however, they will be not so much the kind to possess personally as to consult occasionally in a library.

Industrial Research

The year book dealing with industrial research is a particularly ambitious project. Such an enormous field cannot be fully covered at any time, and currently, of course, industrial research could be described either as a hot-house or a melting-pot. Masses of new information have been released from pent-up war-time secrecy, both U.N. and "Axis," and well before this can be digested innumerable post-war problems have presented themselves, in many cases demanding urgent technical treatment.

Fortunately the Treasury has at last looked benevolently upon research expenditure during the past few years, and industrial firms or groups of firms have been able to develop clearly defined research departments or organisations and set off a good deal of their cost against normal profits taxation. Less fortunately, buildings and technical man-power have been grievously scarce during the same period, and many well-intentioned research organisations must still proceed at half-cock despite patronage from Dr. Dalton and his predecessor. With such a background, therefore, we might expect a 1947 guide to industrial research to depict a rather confused and uncertain panorama, and it is greatly to the credit of the editor that the book is exceptionally clear and definite.

The plan of this reference book is worth describing in detail, for this, more than anything else, will enable readers to assess its value for their own particular purposes. Following three general articles, there is a section giving directory information about government and public bodies interested in research, *e.g.* Agricultural Research Council, Imperial Institute, etc. This is followed by a series of policy statements from these official organisations. The next and much larger section consists in policy statements from the many private organisations that deal with research and industrial development, *e.g.* British Baking Industries Research Association, Wool Industries Research Association, Atomic Scientists' Association, etc. This private research section is a most praiseworthy collection of information, and should be of great value to many business men seeking solutions of problems.

Sections 8 and 9 deal with the research facilities of universities and technical colleges. Section 10 gives details (fairly brief) of the research arrangements of over 270 private firms; this section is naturally somewhat incomplete, but on the whole private enterprise in 1947 seems to have been more willing to reveal than to conceal. The next section lists consultants, giving concise but adequate details of the various fields covered and the services offered. There follows a section dealing with official committees such as the Advisory Council of the D.S.I.R. and the various "working parties."

The thirteenth section deserves its own paragraph of special commendation. This is a list of books, periodicals, and films—mainly covering 1946 and preparation for 1947—which have a direct or partially direct bearing upon research. The amount of information gathered together in this section is in itself a tribute to the year book's editorial energy; its arrangement in convenient subdivisions is a tribute to editorial skill. For many, this section will be the most valuable of the book.

Some criticism might be reserved, however, for the final section, "Who's Who in Industrial Research." Here the size of the field has certainly beaten the recorders; such a list of names must be incomplete in the space available, less than thirty pages. There are names one looks for in vain, and in some retired cases there are names one would not expect still to find in 1947.

Social Welfare

The other year book, *Health and Social Welfare*, follows very much the same pattern, but in some senses the field it covers is more precise. There are rather more general articles in the opening section of the book, but one must express some surprise that there should be an article on aiding the ex-convict and yet no article on the relation of nutrition to health and social welfare. This does not mean that any one will think the ex-prison article is out of place; but when there is room for this specialised and restricted aspect of welfare and

* *Industrial Research*, 1947. Advisory Editor, Percy Dunsheath, C.B.E., M.A., D.Sc. Pp. 536. London. 25s.

Health and Social Welfare, 1947. Advisory Editor, Lord Horder. Pp. 528. London. 25s.

health, why has nutrition—a very general bedrock of these matters—been omitted?

The article by Dr. Amor of Imperial Chemical Industries on the duties of a medical officer in a large factory will perhaps appeal to industrial readers more than the other articles. On the whole, this reference book will be mainly of interest to those who work closely with local and national health service organisations; but it could legitimately have been of greater interest to the food industry had more attention been paid to nutrition, canteen arrangements, etc. However, the emphasis has been placed upon the medical aspects of social welfare—probably a correct decision, but one cannot help wondering whether social service is really so near the hospital and so far from the kitchen. —D. P. H.

American Frozen Food Industry

FROZEN foods constitute the fastest-growing branch of food production in the United States today. In the depression years the canning industry had surplus crops on hand, and not wishing to can them because of the depressed market, manufacturers looked for another outlet, with the resulting birth of the present commercial frozen food industry. From that time until 1940 the young industry made rapid strides, aided by a relatively small research programme and a favourable consumer reaction to a product which is a combination of novelty and quality basic food.

The war years, however, made demands far beyond the industry's efficient capacity. Production in 1939 was estimated at around 826,000,000 lb., but by 1945 the output of frozen foods had reached nearly 2,000,000,000 lb. All sections of the industry shared in the increase, but particularly the fruit and vegetable side.

Quantity not Quality

The rapid expansion had its drawbacks. Materials and man-power necessary to maintain and develop the industry were unavailable. However, there was no lack of monied concerns, usually without basic food knowledge, who eagerly speculated in frozen food processing and distribution but contributed little to the ethical development of the industry. The result has been that quality suffered. Unsatisfactory selection of raw produce, improper processing, poor packaging, and haphazard distribution without sufficient temperature control contributed to a poor quality product, although luxury prices were maintained and, as with many other things, little competition during the war years did not prevent the industry flourishing. But consumer resistance eventually made itself known with benefit.

As a result of much public dissatisfaction considerable improvement has taken place of late. Recent information from the frozen food packers indicates the magnitude of the transportation requirements, and it is clear that the expansion of transport facilities has not kept pace with the increased volume of frozen foods being moved to market. A large percentage of all frozen fruits and berries is packed in large containers, ranging in size from 30 lb. tins or barrels, and is principally used by bakers, jam and jelly manufacturers, and ice cream companies. The total frozen fruit packed for 1946 amounted to 523,281,201 lb. and vegetables around 450,000,000 lb.

In the frozen meat branch of the business, producers are confident that the eventual sale of quick frozen cuts under the self-service system will work as much of a revolution in the meat industry as did the introduction of Western dressed beef through the refrigerator cars years ago. One authority claims that the storing of frozen cuts for one week at 0° F. actually increases tenderness 20 per cent.

The pre-cooked specialities are also gaining a great deal of attention: stews, hashes, French fried potatoes, apple pie, and finally the complete meal, put up in sections so that the housewife can select any combination of meat, potato, and vegetable to suit all members of the family.

Food Locker Plants Established

In both Canada and the United States the method is going beyond producer and distributor; it is entering the consumer's domain. Food locker plants in which small lockers of a few cubic feet capacity in public cold storages are rented to individual families are becoming fashionable, and are in fact firmly established in many centres.

Quick frozen foods will no doubt continue to flourish, but they must be kept at a low temperature from the moment they are frozen to the time they are prepared for the table, hence the necessity of sufficient refrigeration space in the homes to take advantage of the results of the preparation of frozen foods at the point of production and in wholesale and retail establishments.

One of the first radically new post-war containers to cope with the retail frozen food trade has just been introduced on the Canadian market. It is a composite fibre and metal carton dispensing with an inner and outer wrapping, making possible high-speed closing and filling for the first time in the frozen food industry, and can be opened at either end by the standard type can-opener.

Packaging and the Food Industry

FEARS OF FURTHER SHORTAGES

The shortage of fibreboard packing cases is still a matter of grave concern. The food industry has approximately 60 per cent. of all the cases now made, but demand exceeds supply, which is limited by shortage of raw material and coal. The annual production of fibreboard cases for all goods is now about 60 per cent. of capacity, and no important increase can be expected while present conditions last. Indeed the uncertain fuel outlook and the anticipated reduction in winter wastepaper collections will act as a brake on the British fibreboard packing case industry. Another factor which has to be considered is the possibility of further reductions in imported materials such as liners, as part of the national economic policy.

The manufacture and usage of fibreboard cases are governed by the Paper Control, which authorises production on a quota basis, the present quota being 80 per cent. of the norm (based on 1940 production) representing the total for which licences will be issued. Nevertheless, it will be obvious that any recurrence of the difficulties of last winter will seriously interfere with actual deliveries even within these limitations. Requirements, however, are considerably in excess of this as production of many commodities is greater than in 1940, in addition to which many new products are coming on the market for which no packing can be found.

In these circumstances, it is difficult to see how an increased allocation can be made to the food industry without prejudicing other pressing claims. The question as to whether fibreboard cases of suitable strength can be made available to meet an expanding export trade has also to be settled.

Much attention has been paid to the requirements of the food industry both in official circles and by the members of the Fibreboard Packing Case Manufacturers' Association, and the situation can be eased by the re-use of existing cases and by the support of national and local waste paper salvage campaigns. The recovery of used fibreboard cases has grown since 1940 to over 50,000,000 a year. From the hygienic viewpoint this is not an attractive proposition, but it has at least helped to prevent a serious breakdown in distribution.

The recovery of wastepaper, on the other hand, is not so promising. In 1942, over 800,000 tons of wastepaper were collected in this country, half by trade sources and half by Local Authorities. In 1946, the collection was 600,000 tons, a drop of 200,000 tons due entirely to a fall in domestic salvage. At the same time, increased quantities of wastepaper have been thrown away in dustbins; present losses in this manner are reliably estimated at 200,000 tons a year. Raw material supplies, therefore, depend on diverting this tonnage of wastepaper into salvage. The importance of this to the food manufacturers is that 60 per cent. of every solid fibreboard case is processed wastepaper. Judicious publicity by food manufacturing firms urging their employees to salvage every scrap of wastepaper at home is therefore worthwhile and necessary.

Winter is likely to bring added difficulties to the manufacturers of fibreboard packing cases, and it is to be hoped that the authorities will realise the essential nature of the industry and so prevent any possibility of a breakdown in supplies.

Fuel and the Future

The proceedings of the recent conference organised by the Fuel Efficiency Committee of the Ministry of Fuel and Power are to be published in three volumes. Orders for the first volume should be placed without delay.

Some Personalities at the Dairy Show

Mr. G. W. Pangbourne, sales manager, Alfa-Laval Co., Ltd.

Mr. T. C. D. Atkinson, managing director, Perkins Clean Milk Equipment, Ltd.

Mr. J. Matthews, manager of A.P.V.'s dairy engineering department.

A typical coach-built body for electric vehicles.

Electric Vehicle Bodies

Produced for the food distribution trades, transport, and railway companies, the coach built bodies manufactured by Eccles (Birmingham), Ltd., for electric vehicles are of standard design with all metal panels, the prefabricated bodies being built with cab, or cab separate.

Fermentation Industry Lectures

On October 15 the Sir John Cass Technical Institute re-opened its Department of Fermentation Industries which was closed at the outbreak of war. About one hundred and fifty students have enrolled for a series of ten lectures on "Bottling."

The Institute has been fortunate in gaining the services of experts in every phase of bottling and each will give one lecture on matters with which he is intimately connected. On the opening night Mr. H. G. Slaughter, of Truman, Hanbury, Buxton and Co., Ltd., delivered an informative paper on the subject of "Cold Store Practice."

Forms for enrolment to the subsequent lectures may be obtained from: The Secretary, Sir John Cass Technical Institute, Jewry Street, Aldgate, E.C.3, the fee for the course being £1.

Frozen Food from Holland

Three Dutch deep freezing plants are being bought by the British Co-operative Wholesale Society and Dutch interests to export fresh frozen fruit and vegetables and other produce to Britain.

Ice Cream Equipment

Among the wide range of equipment for use in the manufacture of ice cream exhibited by Alfred and Co., Ltd., at the recent Dairy Show were ice cream cone cabinets, high speed immersion type mixers, emulsifiers, refrigerated stainless steel storage vats, freezers, and boiler-pasteurisers.

Emulsifiers and Fat Extenders

Specialising in emulsifiers and fat extenders, D. S. Woods (Chemicals) offer a range of pure chemical products which, although new to the food industry in this country, have been applied to the industry in the United States. Strictly conforming with all the requirements of the Food and Drugs Acts, these products are the result of some years of research, samples for evaluation purposes and full technical data being available on application.

OBITUARY

We regret to announce the death, on October 12, of Dr. Stephen Miall, editor of *Chemistry and Industry* since its launching in January, 1923, until his retirement in June, 1945. During these years he moulded the journal into its present form from a small fortnightly *Review*, bringing a new way of expression to chemists and many others by means of his lucid style of writing. His success can also be attributed to his ready friendliness towards both contemporaries and juniors, and he will be remembered for his acts of encouragement by many writers.

*

It is with regret we announce the sudden death, on October 20, of Mr. James Sim, B.Sc. (Eng.), chief draughtsman of G. and J. Weir, Ltd.

Serving his apprenticeship with Fullerton, Hodgert and Barclay, Ltd., of Paisley, and after further experience with the Mirlees Watson Company in Glasgow, he joined G. and J. Weir's staff in 1909. Mr. Sim's technical abilities were outstanding, and were shown, in particular, in his work in the development of the Weir closed feed system and the regenerative condenser in which he carried out much of the pioneering work and for which he has many patents to his credit. In 1924 he wrote the book *Steam Condensing Plant* which has become a recognised text book on the subject, and read many papers before Engineering Societies on subjects connected with boiler feed systems and equipment.

*

We regret to announce the death of Dr. Bruno Rewald, Ph.D., in the U.S.A.

His name will always be associated with the pioneer work on the production and uses of vegetable phosphatides, on which subject he published many papers. For many years he was connected with the Hansa-Muehle A.-G. of Hamburg, on the production of soya phosphatides, and in 1933 he took up the position of chief research chemist to Fredk. Boehm, Ltd., in London.

Packaging Material

Composed of alternate layers of sisal fibres and bitumen covered by Kraft paper, Sisalkraft, manufactured by British Sisalkraft, Ltd., has many uses, some of which are demonstrated in a recently produced technicolor film. Capable of surfacing with other substances including metallic deposit, its wear-resisting, dust and vermin-proof qualities make it effective as a packaging material for consignments of all kinds of goods as well as a protective covering for food in storage. The lining of poultry houses and other farm buildings, the covering of hay stacks and stock piles, and the screening of plants from intemperate weather may be mentioned besides its numerous building uses.

Ice Cream Traders' Banquet

Members of the London and Home Counties' Division of the Ice Cream Alliance attended the first annual banquet, held at the Connaught Rooms, on October 9.

The President, Mr. Victor Cianfarani, managing director of the London Ice Biscuit Co., Ltd., responding to the toast by Mr. Frank J. Clarke, of Cherry-Burrell, Ltd., said that the ice cream trade was in a very precarious position. Ingredients were not being increased, and the export drive for dairy and other machinery in addition to the continued limitation of prices to not more than 50 per cent. above those obtaining before the war made the situation for traders more difficult than ever.

The ice cream trade had been singled out for total extinction during the war and was not being given a fair chance. Its connexion with the dairying industry, of which the trade was proud, brought in its wake pinpricks galore, which was far from equitable.

The Limitation of Engagements Order was causing grave concern already to traders at seaside resorts, who were more or less forced to retain a full staff during the slack winter months for fear of not being able to secure them for the season proper.

Mr. H. A. H. Crowther

Well known as a dairy technologist on both sides of the Atlantic, Mr. H. A. H. Crowther has recently accepted the appointment of general manager of Shanahan's, Ltd., one of the most active organisations in the applied chemical industry in Canada.

Mr. Crowther's name has become synonymous with hygiene and sanitation in milk production and processing in particular and the food industries in general. It has been said of him that during the years when he was Technical Director of the British Hydrological Corporation he lifted the formulation of detergents from the level of "black magic" to its present plane of applied science. As general manager of Deosan, Ltd., he has changed the industry's approach to the question of chemical sterilisation.

From his university days Mr. Crowther has been concerned with hygiene and sanitation through chemical control. He has published sixty-three papers on this subject, some of them jointly with Liddiard. The Liddiard-Crowther "partnership" will be recalled as a most fruitful one in dairy science.

One of the most popular speakers on dairy hygiene in Great Britain, Mr. Crowther has been an active member of the Dairy and Ice Cream Equipment Association, of which body he was President last year.

His going will create a gap in the affairs of the Society of Dairy Technology. As joint Honorary Secretary of the Society and a member of Council he has been active in the Society's affairs, but it is as chairman of the Editorial Board that his most outstanding contribution has been made. The *Journal* of the Society owes its existence very largely to his activities, and the appearance of the first issue in October, 1947, was the combination of a great deal of work by Mr. Crowther and his fellow members of the Editorial Board.

Mr. S. T. Killick

Mr. S. T. Killick, B.Com., who recently took up his duties as Secretary to the British Baking Industries' Research Association, has now been elected a Fellow of the Chartered Institute of Secretaries.

Mr. W. J. Moriarty

Following his thirty-one years' service with Southall and Smith, Ltd., Mr. W. J. Moriarty has now joined the staff of the Automatic Weighing and Packing Machine Company.

Herring Oil

Experimental plant and machinery for the extraction of oil from herring by chemical reduction operated by the Herring Industry Board at Yarmouth were recently visited by officials from the Edinburgh headquarters.

If successful, these operations will result in a considerable increase in the volume of oil available for a wide variety of purposes, including not only edible oil but also substitutes for oils used in many other branches of industry.

The success of this equipment and processing will also ensure herring fishermen of a certain market for the whole catch, instead of, as at present, a market limited by the requirements of the food industry.

FOOD MANUFACTURE 1947 INDEX

The 1947 Index of FOOD MANUFACTURE will be ready in December. Will subscribers in the U.K. requiring the Index send a stamped addressed envelope, measuring 10 in. by 8 in., if they wish to receive it flat. In the case of subscribers abroad, to avoid difficulties of sending postage costs, the envelope need not be stamped. In all cases applications should be addressed to the Subscription Department, FOOD MANUFACTURE, 17, Stratford Place, London, W.1.

Early application is advised.

Extension of Food Research

The Colworth House estate in Bedfordshire comprising a mansion and 1,180 acres has been purchased by Lever Brothers and Unilever, Ltd., from Lord Melchett. The company's widening interest in foods demands considerable research on horticultural problems in order to develop more suitable varieties of fruits and vegetables for processing, so that quality and yield may be improved. At the same time the company's large interests in the production of animal foodstuffs require extension of research facilities for animal nutrition and will involve the operation of a large experimental farm.

It is further intended that the whole of the food research of the company other than that on fatty foods shall be concentrated in due course at Colworth House, for which purpose the existing building will be adapted.

Bakery Research

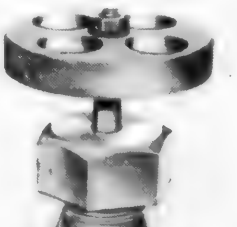
The work of the different Research Associations throughout the country was briefly outlined in a recent B.B.C. broadcast by Dr. J. B. M. Coppock, director of research of the newly formed British Baking Industries Research Association.

Describing the ingredients and the methods of manufacture in use in the baking industry, the Director pointed out the great amount of research work still necessary to understand all the processes involved and the more difficult problem which arose after the bread was cool and staling set in. This latter is a problem to be investigated by the Association as soon as possible, although Dr. Coppock said that the Americans claimed to have found a substance called polyoxethylene stearate which has a pronounced effect on staling.

Stressing the mutual interdependence of research and education, Dr. Coppock concluded his talk by saying that the work of all research Associations could only be brought to full fruition provided a still greater interest in the value of technical training and education was encouraged.

Plastics Exhibition

Opening the Exhibition of Plastics at the Birmingham Council House on October 28, the Lord Mayor of Birmingham (Alderman A. F. Bradbeer) compared the importance of the plastics industry in his city to that of the pottery industry in Stoke.



Refrigerating valve with the wheel and other moving parts made of Tufnol.

The exhibits on the stand of Tufnol, Ltd., showed how wide is the influence of plastics in the industrial life of the city. Bearings, gears, pulleys, aircraft and marine craft components, motor car parts, electrical insulators, and radio accessories, demonstrated the value of laminated plastics in almost every industry.

Kingston upon Hull

A booklet issued by the Development Committee describes the City and Port of Kingston upon Hull, showing the extent of the principal trades carried on in the port and outlining its function as a commercial and industrial centre.

A comparison between the number of workers in industry in the last normal year before the war and those at present engaged in this sphere reveals that today there is an increase of 10,000.

Building Exhibition at Olympia

A wide range of engineering services for buildings and factories is being displayed by Richard Crittall and Co., Ltd. and associated companies at the Building Exhibition held at Olympia from November 19 to December 4. In addition to the heating systems by electricity, gas, oil, and solid fuels, attention is called to their ventilation systems, modernised boiler-house installations, air infiltration and fume exhaustion, humidity control, and other services. The associated companies exhibiting on the same stand, present a variety of patented devices including the Channel Conduit electric wiring system; Heather air filters; process plant and equipment; drier and radiant heat process appliances; tanks, vats, and special vessels for industrial uses; sheet metal work; and the Crittall kitchen and canteen equipment used in factories, railway restaurant cars, and in the home.

New Rail'way Rates

A publication containing the present-day railway rates based on the October 1, 1947, increases is now available. All the standard charges for classes 1 to 21 are shown for every mileage up to 750 miles. In addition to the station to station rates, the actual "Carted or Delivered" and the "Carted and Delivered" rates are shown. By reference to the mileage any Standard Railway Rate may be obtained at a glance without any calculations. The cost is 10s. 6d. post free.

Steam Economy

The increase in the cost of coal and the continuing unsatisfactory position of coal production are adding greatly to the problems facing the industrial steam user.

A feature of a new bulletin issued by Spirax Manufacturing Co., Ltd. (*Spirax Technical Bulletin*, No. 16), is that it concentrates on the simple ways in which one can get more value out of steam, the suggestions and recommendations being effective without involving heavy costs or extensive plant alterations.

Blackberry Pulp from Eire

Among other commodities brought over from Eire by G.W.R. boats were 170 tons of blackberry pulp for rail despatch to preservative works in this country. The pulp was packed in special casks to prevent fermentation.

Ink and Paint Industry

In order to separate more effectively their printing ink industry and paint industry activities, the formation of two new selling subsidiaries is announced by Coates Brothers and Co., Ltd. Coates Brothers Inks, Ltd., will serve the requirements of the printing and allied industries, and Coates Brothers Paints, Ltd., will concentrate on the sale and development of specialised paint industry products. These arrangements applied to all home and export territories as from November 1, 1947, with the exception of those territories where subsidiary or associated companies are established.

It is also announced that as from November 1, 1947, manufacturing and trading interests in India will be carried on by a Rupee company under the style of Coates of India, Ltd. The new company will operate from enlarged factory premises in Calcutta, and, subject to raw material limitations, will be able to supply the complete range of products developed by the original London company.

COMPANY NEWS

At the seventieth annual general meeting of the Distillers Co., Ltd., both a final and a special dividend on the Ordinary stock of 2½ per cent. less tax were recommended, and the deputy chairman, Mr. H. J. Ross, presiding, announced that an interim dividend on the Ordinary stock in respect of the year to March 31, 1948, would be declared at a later meeting.

Commenting upon the operations of the company's three yeast factories, Mr. Ross said that their main product, bakers' yeast, continued to meet an increasing demand at home and abroad. The sales of yeast products had shown satisfactory progress, and tenders had been received for the erection of the new yeast factory in the South of England, although licences had not yet been granted. They had, however, been granted for the establishment of an outstation for research and pilot plant work at Glenochil Yeast Factory, Clackmannan, which would be run in close co-operation with the company's main research station at Epsom.

■

A total final dividend of 30 per cent., less tax, on the Ordinary share capital has been recommended by the directors of Weston Foods, Ltd., for the year ended March 29, 1947. An increase of nearly £64,000 shown in the profits of the company is to be retained in the business by raising both the allocations to reserves and the amount of profits carried forward.

■

An increase of £218,864 in profits for the year ending March 29, 1947, has been announced by Allied Bakeries, Ltd. The directors have decided to pay a total Ordinary dividend of 20 per cent. as for the last period and to divide a part of the increase between the Investment Reserve and the Depreciation Reserve, the balance being carried forward.

A.P.V. Acquire Paramount Alloys

To meet their increasing requirements in stainless steel castings the Aluminium Plant and Vessel Co., Ltd., have purchased the business of Paramount Alloys, Ltd., which is engaged exclusively on the production of stainless steel castings, and will be operated as an independent subsidiary.

The company have been developing the latest methods of producing stainless steel castings at one of their foundries at Wandsworth, but, in future, production will be mainly concentrated at Paramount Alloys. At present the output will be taken up entirely by A.P.V.'s own requirements, but, when the equipment of the Paramount foundry can be sufficiently extended, its facilities will be made generally available.

OBITER DICTA

● My wife can't understand the Americans; she says it isn't as if they wanted to eat dried egg themselves.—*Heard in a London Court.*

● Many restaurants would have little custom if the kitchen were separated from the dining hall merely by a glass wall so that conditions could be seen.—*Dr. Sutherland.*

● The water for washing beer glasses in some public houses that I have seen can only be described as "diluted saliva."—*Overheard at the conference on food and drink infections.*

● I do not see why exception is taken to the word "tripe." Tripe is a most popular commodity in my constituency and we would like more of it.—*Mr. Hale, M.P. for Oldham.*

● To sit in the sun 3,000 ft. up and look at one of the loveliest views in the world, and then to find British biscuits which we have long since forgotten, warms one's heart.—*Letter in "The Times."*

● I would gladly exchange my priority milk and eggs for the ordinary ration with anyone who may be tantalised by the sight of priority eggs, if I could at the same time exchange my ulcerated stomach for a cast-iron one.—*Correspondent to the Brighton "Evening Argus."*

● The basis of any meal should be the builders. I hope the days are gone when a big rice pudding, or bread and something, were thought suitable food for children. Slabs of Yorkshire pudding like cement before the main course may be thrifty, but they are dietetically naughty.—*The Radio Doctor.*

● Not one of you grumbled about the unit margins being maintained when sugar dropped from 5d. to 4d. per lb., and from 4d. to 3d. per lb. . . . But when a price goes up, the unit margin is not so good and you want a percentage. You cannot ride two horses at the same time and I do not know how you can think that the Federation officers can do so, to be consistent, at the Ministry of Food.—*Mr. W. Herman Kent, secretary of the National Federation of Grocers' and Provision Dealers' Association.*

Italy's Food Fair

Despite present-day difficulties, about 150 firms exhibited their products at the second Exhibition of Preserved Foods held at Parma from September 7 to 21, 1947. Included in the exhibits were preserved foods, packaging materials, a new preparation of enzymes for the clarification of fruit juices and other biological preparations, and varnishes. Considering its technical nature, attendance at the exhibition by some 50,000 visitors, among whom were many from foreign countries, was notable.

Among the exhibits of equipment of Italian manufacture were closing machines for food containers, filter presses, bottle fillers, a novel machine for the stoning of cherries, hydraulic presses for the extraction of fruit juices, automatic can-making and labelling machines. Other items were plant for the preparation of fruit for jams and marmalades. Scientific instruments such as refractometers, balances, and centrifuges were also exhibited.

That Italian food manufacturers were well catered for by producers of practically the whole range of essential plant and equipment whose products were keeping well in step with modern methods was amply demonstrated at the exhibition.

A conference convened by the *Comité International Permanent de la Conserve* and attended by delegates from all parts of the world was held during the exhibition, a report of which is published in this issue.

It is the aim of the organisers to hold annual exhibitions of this nature in order to bring before the public the latest developments in Italian food products in conjunction with plant and equipment for their preparation, and with this object in view, next year's exhibition, which is to be held in a new pavilion, promises to achieve complete success and form a further step forward in fostering the development of the Italian food industry.

Fruit pulping plant. *Courtesy F.Lli. Nulli and Co.*

Canning-measuring plant for concentrated tomato paste. *Courtesy Migliavacco Carlo and Figli.*

Hydraulic presses for the extraction of fruit juices and fruit pulping plant. *Courtesy Bucher Guyer.*

New Use for Penicillin Waste

Penicillin waste is now being marketed in the United States to improve cattle feed, reports the New York *Journal of Commerce*. For less than one dollar, one ton of livestock food can be enriched with the former waste by-product.

Wheat Production Levels

According to a recent provisional forecast of the Food and Agricultural Committee of the sixteen-nation European economic conference held in Paris, it is estimated that the European production of wheat and other cereals would attain its pre-war level of 34 million tons by the period 1950-1951, despite the fact that the production figure for wheat, rye, and other essential cereal foodstuffs in the participating countries and Western Germany had fallen to 21,400,000 tons.

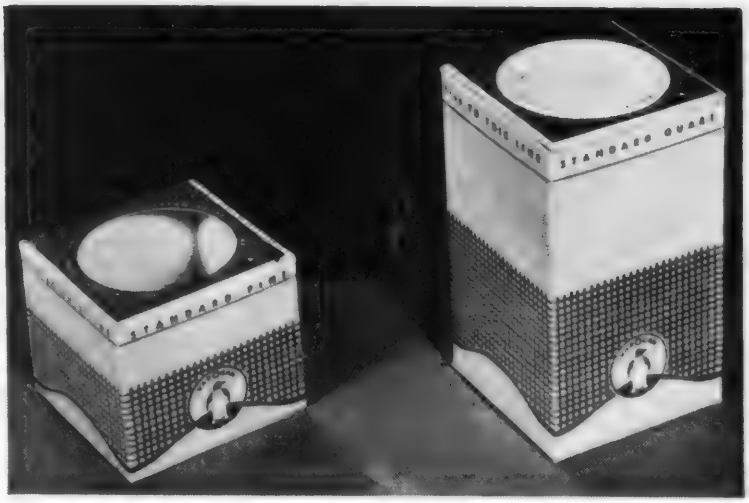
New S. African Vitamin Plant

A new vitamin concentrating plant, now being built for the Vitamin Sales Corporation of South Africa at Simonstown, is due to go into production next January.

Soup-fin sharks and ling cod—abundant in South African waters—will provide the raw materials for the factory, and the extracted crude oil will be concentrated while simultaneously being de-colorised, de-odorised, and separated from the waxy substances which cause the vitamin oil to cloud at low temperatures. The final product will be a vitamin oil concentrate containing 500,000 or more I.U. per gram of vitamin A.

The residual oil—which amounts to more than 90 per cent. of the original total—will be recovered in its original glyceride form and either processed further to yield oils for the manufacture of printing inks, linoleum, leather and sulphonated oils, or used as poultry and animal feed or as soap stock.

Output of the plant is expected to exceed the present level of domestic requirements, thus leaving a surplus for export purposes. —*Reuter.*



The new light liquid container, Vapocan, for frozen foods.

New American Packs

Developed by the Sylvana Division, American Viscose Corporation, the "high-hat" package for nuts or candy is made in paperboard which clips on to the Cellophane package.

The high-hat pack for sweets.

A new light liquid container for frozen foods, known as Vapocan and manufactured by the Container Corporation of America, is also of paperboard with a snap-in metal top. Both paperboard and top are treated with a special lacquer so that neither can affect the taste of the contents. The whole is then coated with a special thermoplastic compound which is an effective barrier to moisture-vapour transmission and prevents drying inside the container, at the same time rendering it watertight.

Exports of Polish Meat Products

The Central Administration of the Meat Products Industry has twenty factories under its management, producing cooked hams, stewed steak, jellied meats, and bacon. In 1947, only preserved meats which do not require tins will be exported, of which 300 tons of frozen geese and 770 tons of other meats and bacon will go to Great Britain.

The shortage of tinplate in Poland prevents an increase in exports, production amounting to about 120 tons a month, whereas 400 tons are needed.

In 1948, exports of 350 tons of frozen geese, 150 tons of turkey, 2,500 tons of bacon, and 600 tons of ham to Great Britain are anticipated.

Food in Italy

REVIEW OF PRESENT CONDITIONS

Soya Bean Production

Although it is maintained by some authorities that the soya bean is not a suitable crop for Italy on account of its low yield, reports from the Province of Padua reveal that the crop yielded 1 ton per acre for the first harvest and about ·5 ton for the second. In some cases the first harvest produced as much as 1·25 tons per acre. Future crops are likely to exceed considerably the 1·25 ton mark as a great deal of work is being carried out in connexion with fertilisers and soil improvement.

To further the development of the new crop a group of local agriculturists have formed a company which will erect an up-to-date industrial plant, the first of its kind in the country, capable of extracting such products as crude and refined oil, raw phosphatides, and vegetable casein from the soya.

Olive Oil Crop

The present crops of olives are expected to yield about 250,000 tons of oil this year. A new policy is to be adopted for oil, producers being no longer obliged to surrender their total output to rationing pools. Only 80,000 tons must be supplied by them to provide for the ration to be received from November 1, the balance to be sold as they please. The improvement in prices and the possibility of selling freely 68 per cent. of their product are expected to deter oil producers from evading oil pooling.

Sugar Prices

The recent decision of the Government to fix the price of sugar for the sweets and jam factories at a higher level than that destined for rationing is causing much discontent in industrial circles, the object being to keep down prices of sugar for the householders' ration. From a practical point of view the small saving on the cost of the householders' monthly ration makes no difference, while an increase in production costs may cause complications for the manufacturer. In addition to this the reduced allocations of sugar for manufacture are resulting in the jam industry being unable to compete with other countries who are threatening the home markets.

Canning Factory for Jamaica

A canning and processing factory capable of producing 500,000 cases of mixed products a year is to be built in Jamaica by the Jamaica Canning Company. The company has been purchased by British interests.

Filling Weight Control

An automatic and continuous method of controlling package filling machines that will reduce costly overfilling to a minimum as well as eliminate every underweight package from the finished pack, the "Weightrol" developed by The Fred Goat Co., Inc., of Brooklyn, weighs every package and warns the operator whenever the filling machine starts to fill above or below the limits of its inherent filling error. By indicating the average weight of the packages the machine makes it possible to regulate filling machines to closer limits than has heretofore been practical. In addition, the "Weightrol" can be set to eject automatically every underweight and/or overweight package from the line. A chart recorder provides effective means of checking the efficiency of operating personnel and filling equipment.

Eire's Tinplate Supplies

Irish manufacturers who use tinplate for packing hope for increased supplies as a result of representations made recently to the U.S. authorities, who promised to do their utmost to increase Eire's allocation.

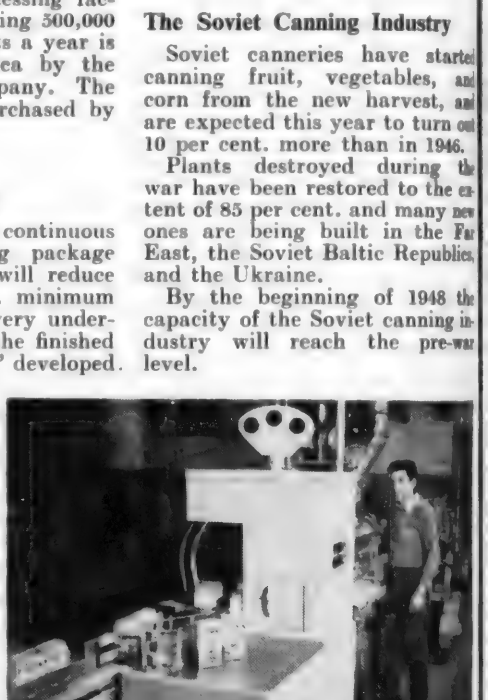
It was intimated that as world supplies of tinplate are not sufficient to meet demand, it would be a strict condition of every allocation that the material be used only in the packing of essential perishable foodstuffs.

The Soviet Canning Industry

Soviet canneries have started canning fruit, vegetables, and corn from the new harvest, and are expected this year to turn out 10 per cent. more than in 1946.

Plants destroyed during the war have been restored to the extent of 85 per cent. and many new ones are being built in the Far East, the Soviet Baltic Republics, and the Ukraine.

By the beginning of 1948 the capacity of the Soviet canning industry will reach the pre-war level.



The "Weightrol" machine in operation.

Refrigeration Technique

To mark the completion of fifty years of progress, the Danish refrigeration firm of Thomas Ths. Sabroe and Co., Ltd., have issued a well-produced and fully illustrated booklet comprising details of their share in the propagation of the technique of refrigeration. The booklet includes a summary of the most important types of freezing and cooling plants, among which are those for marine refrigerating plants, dairies, bakeries, and industrial equipment, a great variety of which are manufactured by the company.

Fish Canning in Eire

Recently formed in Eire to engage in fish canning at Killybegs, Co. Donegal, a new company, Donegal Canners, Ltd., will specialise in tinned Donegal Bay brisling, a fish caught in large quantities on this part of the Irish coast.

Highly specialised plant has been imported from Norway and an up-to-date factory is to be built adjacent to the principal landing points so that catches may be handled at the peak of freshness. Herring, kipper fillets, shell fish and, in the off season, vegetables and soups, will also be canned.

Mr. Maurice Greensmith, promoter of the enterprise, who will act as managing director and technical manager, has been associated with the canning industry in England and Ireland for many years. Until recently managing director of Batchelor and Co. (Ireland), Ltd., Mr. Greensmith spent some time in Norway last year studying modern fish canning methods and has also made extensive research into the use of alternative metals for tinplate in the canning industry with special reference to aluminium alloy containers and continental methods of processing these.

With raw materials in such abundant supply in Donegal, the company hope to cater for the export market as well as the Irish home trade.

Production is expected to begin next spring, when a large number of workers will be given continuous employment.

MINISTRY NEWS

Appointments

Mr. I. Graul, until recently the Director of Fish Division, has been promoted to be an Under-Secretary in the Ministry of Food.

Mr. N. W. Damerell, Director of the Bakery Division, has succeeded Mr. Graul as Director of Fish Division.

Mr. W. Donaldson, has succeeded Mr. Damerell as Director of Bakery Division.

*

Mr. Norman C. Wright, M.A., D.Sc. (Christ Church, Oxford), Ph.D. (Gonville and Caius College, Cambridge), has been appointed to be Chief Scientific Adviser to the Minister of Food in succession to Sir Jack Drummond, D.Sc., F.R.S. During the period of his appointment Dr. Wright will, with the concurrence of the Secretary of State for Scotland, be seconded from the Hannah Dairy Research Institute, of which he is a director.

Stock Turkeys

Those dealing in or buying stock turkeys are reminded that the restrictions on the sales of stock turkeys prescribed by Article 18 of the Poultry (Control and Maximum Prices) Order, 1946, will operate during the period November 1, 1947, to December 31, 1947, both dates inclusive. The Order does not apply to Northern Ireland.

The Order provides that, with the exception of producers making direct sales of stock turkeys to persons who are themselves keeping turkeys for breeding, rearing or egg production and are buying the turkeys for one or more of these purposes, no person shall sell, buy or deliver any stock turkeys during the period mentioned except under licence.

Applications for licences, which will be granted only in exceptional circumstances, should be made to the Ministry of Food, Meat and Livestock Division, Bryn Euryn, Dinerth Road, Colwyn Bay, Denbighshire. Such licences will not relieve persons buying or selling stock poultry of their obligation under the Order to give or receive respectively declarations in writing as to the purpose for which the turkeys are bought, or, if the seller is an auctioneer, of his responsibilities under the special provisions of the Order relating to auction sales.

Stock turkeys are defined in the Order as turkeys which are used or intended to be used for the purpose of breeding, or rearing, or egg production, or which are sold or bought for any such purpose, or for resale for any such purpose. Stock turkeys under eight days old are exempt from the provisions of the Order.

The Ministry of Agriculture and Fisheries may from time to time impose restrictions on the sale of live poultry in any specified area because of outbreaks of fowl pest. The issue by the Ministry of Food of a licence to hold a sale does not override any such restrictions.

Export Licensing Control

The changes made in export licensing control provide that no export licences will now be required for fish paste and certain types of processed herrings, pilchards, and sprats. Export licences will, however, again be required for all types of fresh fish (not frozen) other than herrings.

These changes are set out in detail below, with reference to the Export of Goods (Control) (Consolidation) Order, 1946 (S. R. & O., 1946, No. 1661), as amended by subsequent Orders.

First Schedule. "Fish paste" has been removed from the heading relating to fish.

Second Schedule. The existing headings relating to fish have been deleted and the following substituted:

> Fish paste.
>
> Fish as follows: Cod, haddock, hake, ling, pollack, saithe (coal fish), and tusk; salted (dry, semi-dry, or wet).
>
> Herrings: Fresh, not frozen; marinated, when packed in barrels; pickle-cured (salted); red (golden or silver) cured; pilchards and sprats; pickle-cured (salted).

Food from Australia

DISCUSSIONS ON INCREASED PRODUCTION METHODS

Assisted by officials, the Minister of Food and the Australian High Commissioner have discussed the measures which can be taken to increase the production of food in Australia so as to provide larger quantities for the United Kingdom.

It appeared from the exploratory discussions that the foodstuffs which Australia is producing, or may produce, fall into three groups. The first group comprises commodities such as wheat, and sugar, where no long-term expansion of production would seem to be desirable having regard to the optimum use of Australia's resources. Long-term contracts already exist between the Ministry of Food and Australia for sugar, and discussions are taking place for the purchase of Australian wheat and flour in the same manner.

The second group covers commodities where production can be expanded provided that long-term market for definite quantities can be assured by the United Kingdom. Examples under this heading are lamb, dried fruit, and eggs. As part of any general proposals for developing the supply of foodstuffs from Australia to the U.K., the Ministry of Food is prepared to consider sympathetically any proposals which Australia may put forward for giving their producers the required assurance of a continuing market for their products in the United Kingdom. Both lamb and eggs are already covered by long-term contracts, which extend until 1950.

The third group comprises commodities where the expansion of production will call for extensive long-term developmental schemes in Australia. Beef, oilseeds such as groundnuts, frozen pork, and butter, are among the commodities included in this category. Of these items, beef, frozen pork, and butter are already covered by long-term contracts.

Much work has already been done in Australia on the problems of developing agricultural production in new areas such as the Northern Territory. For example, a committee has reported on the possibilities of Northern Australia. If Australia makes the request, the Ministry of Food is prepared to send representatives to Australia to consult with Australian experts. The experience now being acquired in connexion with the East African groundnut scheme for the mechanised production of groundnuts, for example, will be made available to Australia.

In the discussions already referred to for the purchase of Australian wheat and flour Australia has offered to sell to the United Kingdom and the areas for which she is responsible approximately 75 million bushels of wheat and flour on the basis of the present crop estimates, subject to agreement on price. The possibility of further quantities being offered will depend on further estimates of the crop which cannot finally be made immediately.

Import of Chestnuts

It was announced by the Import Licensing Department of the Board of Trade that, from October 13, 1947, unrestricted import of chestnuts in shell, and paprika (ground), would be prohibited, imports being subject to individual licence from that date.

Poultry Mission Report

Special attention to official schemes for improvement of breeding stock was paid by the Poultry Mission which visited North America last autumn on behalf of the Ministry of Agriculture and Fisheries and the Secretary of State for Scotland. The results of their investigations into every aspect of the poultry industry are contained in a report published by H.M. Stationery Office in the "Agriculture Overseas" series, which also includes a number of important recommendations now under consideration by the Government.

Christmas Cakes

An Order has been announced by the Minister of Food authorising manufacturers of iced and decorated Christmas cakes to charge up to 8s. 9d. per lb. for such cakes during the period November 23, 1947, to January 1, 1948, provided that the cakes have a combined content of fats, sugar and/or dried egg solids of 40 per cent.; weigh not less than 1 lb. or more than 4 lb.; are covered on top or on the top and sides with sugar icing, or chocolate, or almond marzipan; and are also decorated.

The price charged must not exceed four times the cost of the edible ingredients, to which may be added the net cost to the manufacturer of inedible ornaments or decorations, subject to a maximum ceiling price for the finished cake of 8s. 9d. per lb.

As the materials needed are limited, the Minister strongly recommends bakers to make the largest possible number of Christmas cakes in small sizes in order to achieve as wide a distribution as possible.

Allocation of Cocoa Beans

The International Emergency Food Council has transmitted to the Governments concerned a recommendation for the international distribution of cocoa beans during the four months from October 1, 1947, to January 31, 1948.

Since reliable estimates of supplies are not yet available on which to base a recommended allocation for the entire cocoa year the Council has agreed to recommend a partial allocation of 429,310 long tons, which represents approximately two-thirds of the estimated supply for the entire cocoa year. This tonnage is distributed in the I.E.F.C. Recommendation among forty-five importing nations or areas. The partial allocation will make it possible to initiate immediately procurement and shipping arrangements. The Council also recommended that allocations of cocoa butter and unsweetened chocolate couverture be discontinued as from October 1, 1947.

Information and Advice

Cream Filling

B.2096. *We shall be glad to receive a recipe for sweet cream fillings for cakes making use of glyceryl monostearate.* (Glos.)

A recipe for a chocolate filling cream using glyceryl monostearate was supplied for modification when chocolate filling was not required. The recipe, as under, was sent as a basis for experiment.

	Parts by Weight.
Water	100
Sugar	100
Cocoa	15
Flour	15
Glyceryl monostearate	1
Shortening	20
Vanilla	1

The paste is made by pre-mixing the cocoa, flour, and about 25 per cent. of the sugar and mixing these to a paste with sufficient water. The remaining water and sugar are brought to the boil, the paste is added, and boiling is continued for several minutes to effect complete gelatinisation. The shortening, glyceryl monostearate, and vanilla are added and stirred in. The batch should be covered while cooking to prevent a skin forming.

Information Supplied

B.2029. *The manufacture of sausage rusks and potato crisps, and the names of firms supplying the necessary equipment; also addresses of firms manufacturing electric steam boilers and electric branding irons suitable for use on hams and sides of bacon.* (E. Africa.)

B.2031. *Literature on the manufacture of meat extracts.* (London.)

B.2032. *The manufacture of potato crisps.* (Eire.)

B.2036. *Manufacturers of electrically operated steam boilers.* (Dorset.)

B.2037. *Addresses of firms manufacturing emulsifying or homogenising machinery and colloidal mills.* (Lancs.)

B.2046. *The use of gum tragacanth in sauce manufacture.* (Glam.)

B.2050. *Literature dealing with the manufacture of baking powders, sugar sweetened sponge cake mixture, unsweetened golden sponge pudding mixture, and tea scone mixture.* (Worcs.)

B.2051. *Manufacturers of waxed paper containers.* (London.)

B.2052. *Suppliers of plant for filling and storing olive and other edible oils.* (London.)

B.2053. *Suppliers of stiff paper outer covers for jam jars.* (N. Wales.)

B.2054. *Manufacturers of a machine for topping, tailing, and peeling onions ready for pickling.* (Warwicks.)

B.2055. *Address of the suppliers of a bench labelling machine.* (Glam.)

B.2060. *Manufacturers of plastic brine vats.* (London.)

B.2064. *Suppliers of shredded suet.* (Glam.)

B.2065. *Manufacturers of jam pot covers.* (Eire.)

B.2067. *Suppliers of gumming machines.* (Lancs.)

B.2067a. *Manufacturers of pressure cookers.* (Cumb.)

B.2069. *The manufacture of caramel colouring.* (S. Australia.)

B.2073. *Manufacturers of homogenising machinery.* (Notts.)

B.2077. *Process used for the manufacture of cornflour.* (Cumb.)

B.2078. *Manufacturers of emulsifiers and colloidal mills.* (London.)

B.2083. *Bottling of olives.* (Yorks.)

B.2084. *Suppliers of a sweetening material.* (Devon.)

B.2085. *Manufacturers of machines for roasting flakes.* (Lancs.)

B.2086. *Suppliers of tensional steel strapping equipment.* (Yorks.)

B.2087. *Manufacturers of a machine for topping, tailing and peeling onions ready for pickling; also the suppliers of pickling onions and the necessary bottles and caps.* (Carm.)

B.2090. *Address of the manufacturers of the "Mucon" valve.* (Warwicks.)

B.2091. *Suppliers of waffle-making equipment.* (Yorks).

B.2092. *Manufacturers of potato crisp packets and machinery for filling the small packets of salt.* (Lancs.)

B.2094. *Manufacturers of lecithin for chocolate production.* (Egypt.)

B.2095. *American manufacturers of maize shellers and rice huskers.* (London.)

B.2097. *Suppliers of a cutting and sheeting machine.* (London.)

B.2104. *Literature dealing with the manufacture of macaroni, spaghetti, and vermicelli.* (Australia.)

B.2105. *Manufacturers of apple peeling and coring machines, also suppliers of ascorbic acid.* (Durham.)

B.2106. *Suppliers of dried blood.* (Yorks.)

Information Required

B.2114. *Plant for cutting gelatine in leaves or flakes.* (South Africa.)

B.2128. *Name and address of any suppliers of sauces in bulk.* (Yorks.)

B.2146. *Name of the manufacturer of Albrecht soup.* (London.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2., price 1s. weekly (annual subscription £2 10s.).

Abstract of Recent Specification

Compression of Foodstuffs into Briquettes without the Use of Binding Agents

A process for the compression of powder, flake, or fibre foodstuffs into durable briquettes without the use of binding agent, wherein the foodstuff is subjected to a rapid withdrawal of heat just before compression, so that the temperature thereof falls from normal room temperature to a point below the dew-point whereby moisture is temporarily formed by condensation on the surfaces of the individual particles.

It may here be mentioned that it has previously been proposed to briquette foodstuffs by compression with the employment of a heating step followed by cooling. The present process is distinct from this in that the heating step is not carried out and the foodstuffs are cooled from room temperatures—*i.e.* about 15° to 30° C.

In the practice of the invention the usual pressures of 100 to 1,200 kg/cm² are used, depending on the nature of the foodstuff to be treated. The cooling step assures that the temperatures reached are below the dew-point—*i.e.* between 15° C. and −4° C. according to the relative humidity and the initial temperature.

The reason why the process of this invention is generally successful in producing neat briquettes is presumably to be found in the fact that by thus rapidly cooling the air entrapped in the foodstuff under treatment to below dew-point, water of condensation collects on the surfaces of each individual particle, and renders it somewhat sticky and therefore suitable for the desired cohesion within the briquette. The compression must follow immediately, before there is time for the moisture to penetrate into each individual particle and therefore become evenly distributed throughout its entire mass. It is required that this latter process should not take place until the foodstuff has been compressed into briquettes and cohesion achieved.

In order that the water of condensation should not be transformed into steam at the moment of compression by the heat generated through the contraction under pressure, the press has to be equipped with air escapes. It is also advisable to this end partly to expel the air from the substance under treatment by a preliminary pressing operation before cooling, or to carry out the cooling operation as far as possible directly before the briquetting compression.

588,354. *Egon Herbert Schwarz.*

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

588,922. CONTINENTAL CAN CO., INC.: Containers adapted for the packaging of powdered or fine granular products.
588,958. ROOS, S.: Manufacture of bread and the like yeast-raised baked goods.
588,968. CORN PRODUCTS REFINING CO.: Polymerisation of dextrose and maltose.
588,975. FEAR, E. D.: Manufacture of milk bread
588,982. DETREZ, R.: Supporting device for bottles and other receptacles on filling, stoppering, capsuling, and the like machines.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

SUNFLOWER.—640,558. Tea, coffee, cocoa, chocolate, and ground chicory. **Joseph Tetley and Co., Ltd.,** Mansell Street, London, E.1; Merchants.

SNIDER'S.—642,799. Chile sauce, vinegar, oyster cocktail sauce, condiments, and apple sauce. **General Foods Corporation** (a Corporation organised under the laws of the State of Delaware, U.S.A.), 250, Park Avenue, City and State of New York, U.S.A.; Manufacturers.

MAXOIL.—643,193. Oil extraction apparatus. **Rose, Downs, and Thompson, Ltd.,** Old Foundry, Cannon Street, Hull; Engineers.

KINGPIN.—644,653. Arrowroot (for food), baking powder, barley flour, barley meal, bean meal, biscuits (other than biscuits for animals), blancmange powder, bread, bread-crumbs, cakes, cereal breakfast foods, flaked wheat, gingerbread, gluten (for food), macaroni, oatmeal, oatflakes, pancake mixtures, pastries, porridge oats, pudding mixtures, rice, sago, sausage filling being cereal preparations, self-raising flour, semolina, sponge mixture, starch (for food), tapioca, tapioca flour, tarts, wafers (biscuits), wheat flour and wheat germ. **Thomas Hulbert and Sons, Ltd.,** New Era Flour Mills, Worsley Street, Hulme, Manchester; Flour Millers.

TRIS BRAND.—648,900. Edible oils and edible fats, all for export. **The British Creameries, Ltd.,** 1, Watergate, Tudor Street, London, E.C.4; Manufacturers.

New Companies

Shepherd's Aerosols Limited. (435619.) To carry on bus. of manufacturers of and dealers in apparatus for disinfecting air and sterilising fittings, etc. Nom. cap.: £25,000 in 24,000 shares of £1 and 20,000 shares of 1s. each. Dirs.: to be apptd. by subs. Subs.: C. A. Garrett and M. L. Wordley (clks.), 118, Old Broad Street, E.C.2.

Frozen Fruit Products (Louth), Limited. (435669.) New Market, Louth, Lincs. To take over bus. of manufacturer and purveyor of iced fruit confections carried on at Louth by John T. Stiles. Nom. cap.: £7,000 in £1 shares. Dirs.: I. M. Ferguson, 84, High Street, Lincoln; J. T. Stiles, 292, West Parade, Lincoln; J. R. Prescott, Reading Road, Fleet, Hants, and 77, Swift Gardens, Lincoln.

Emulsifiers (Powell), Limited. (435744.) 72, Carterknowle Road, Sheffield. To carry on bus. of manufacturers of and dealers in emulsifiers, emulsifying apparatus, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: L. Powell (permt. dir. and ch.) and Elsie Powell, 59, Westwick Road, Sheffield.

James Avis and Son, Limited. (436057.) Grafton Works, Grafton Road, New Malden. To carry on bus. of manufacturers of and dealers in boxes, packing cases, containers, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: P. J. Avis and Mary E. Avis, 106, Westbury Road, New Malden, Surrey; J. T. W. Avis, 2, Pepys Court, Worple Road, S.W.20.

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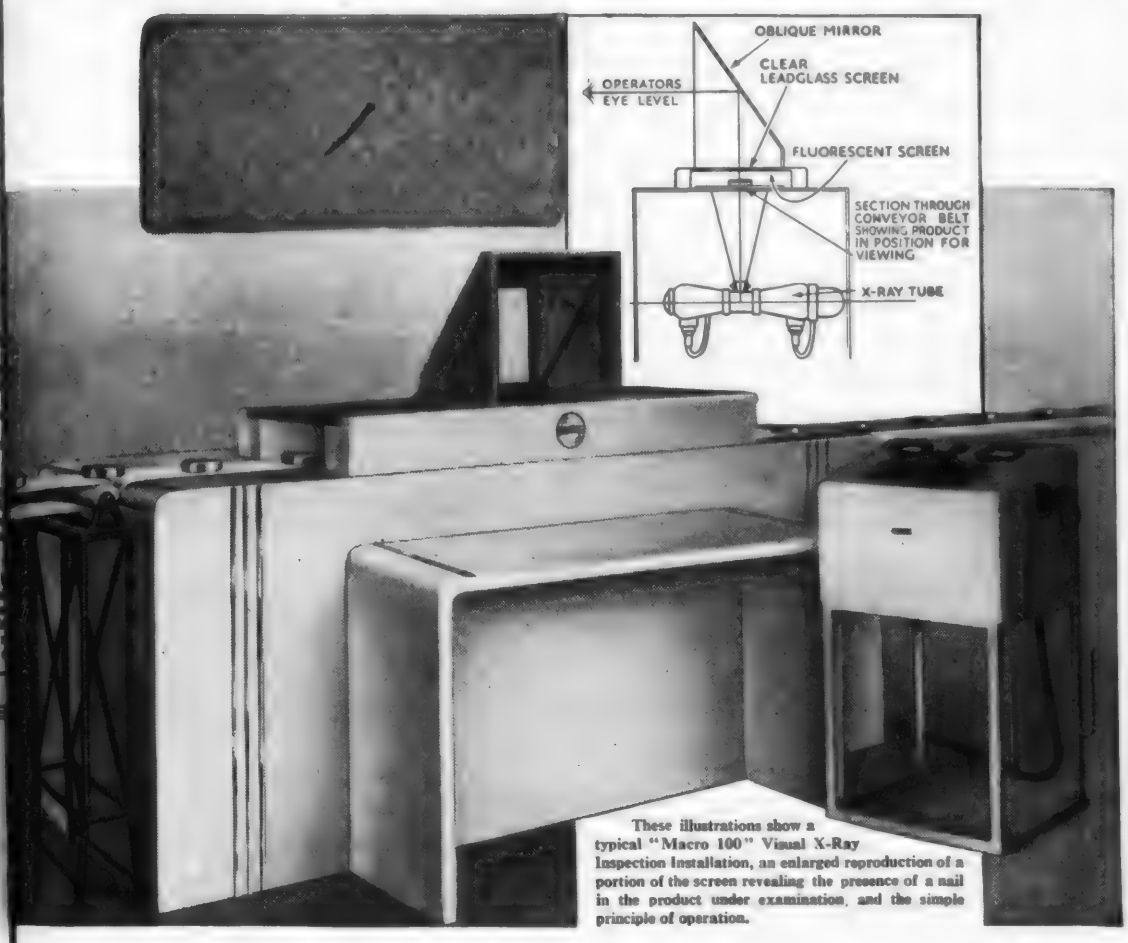

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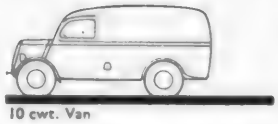

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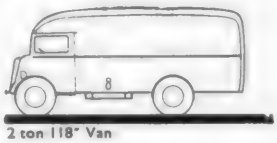

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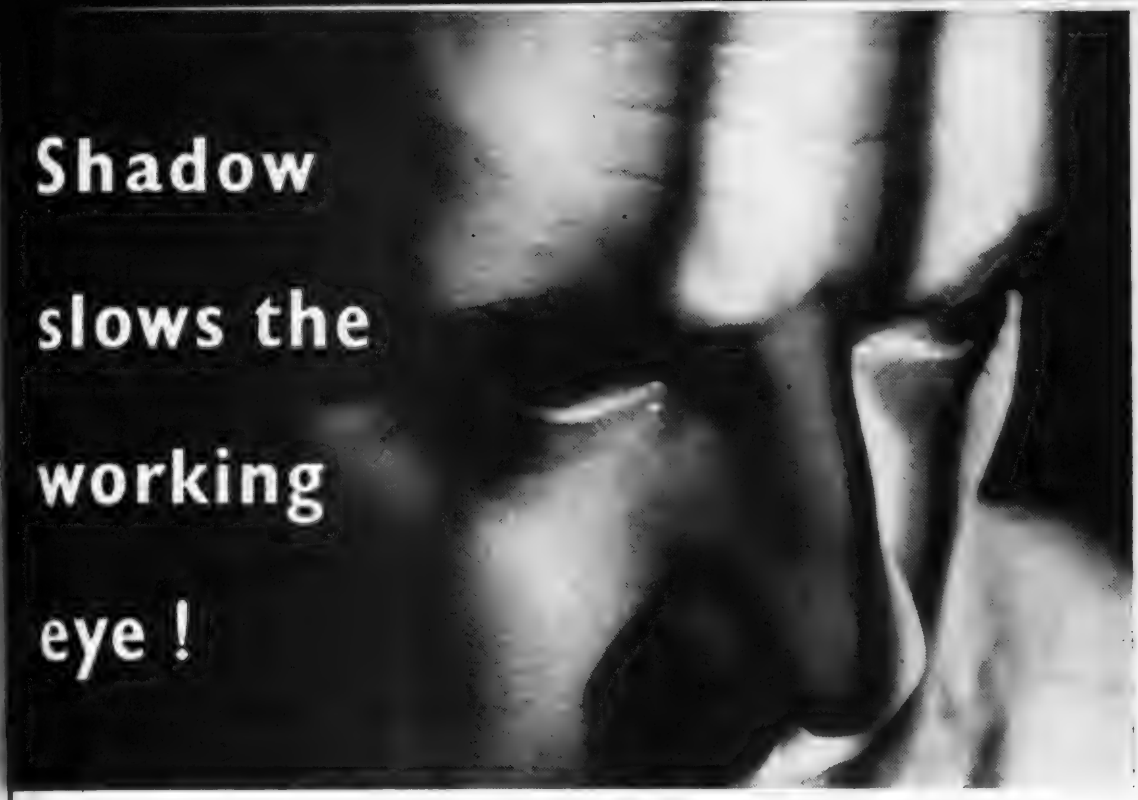

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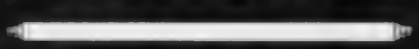

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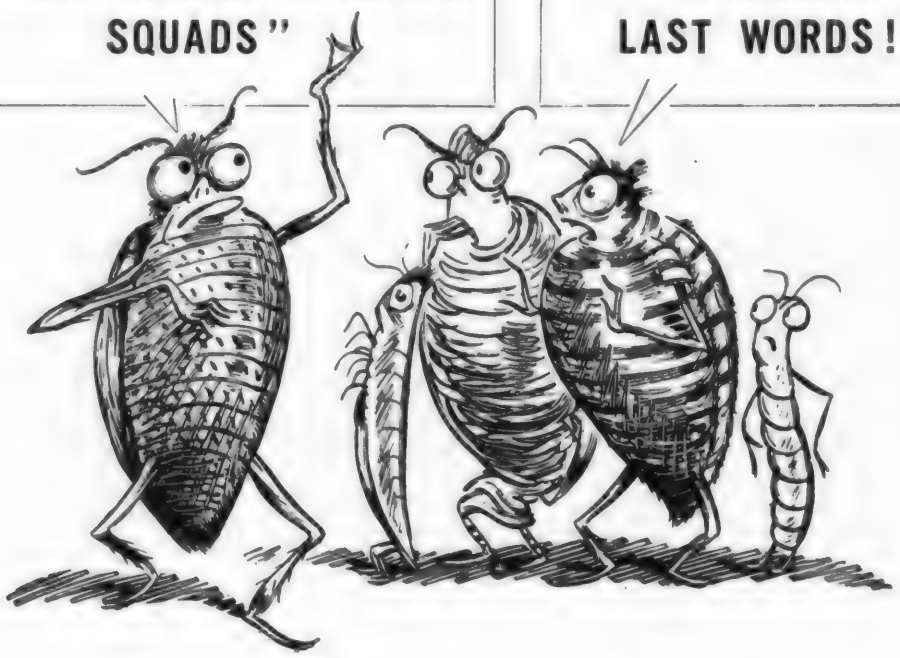

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NEWTON, CHAMBERS AND COMPANY LIMITED, THORNCLIFFE, Nr. SHEFFIELD

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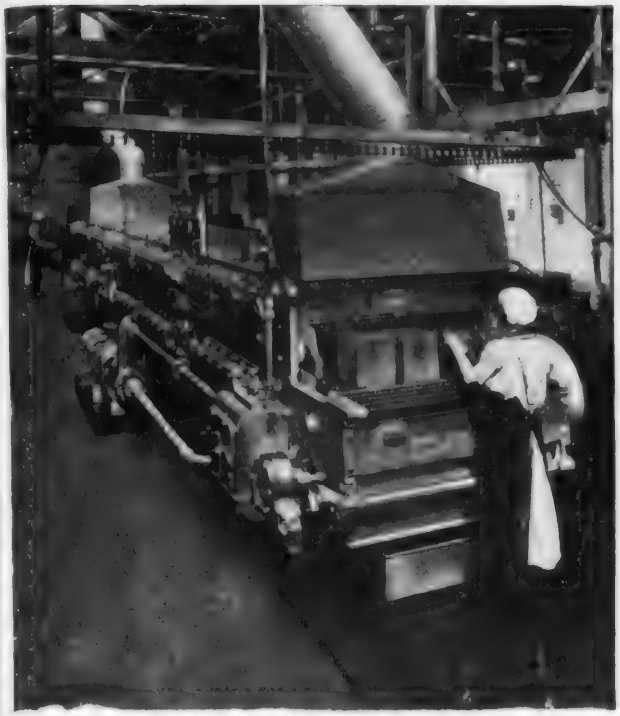

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for Washing, De-labelling and Rinsing Wide-mouth Containers, with patent rotary label extracting, filtering, separating and ejecting mechanism.

Will continuously wash, sterilise and de-label all types and sizes of wide-mouth Containers up to and including 16 inches in height. No stopping to change from one size of Container to another. Used for bakers' boards, biscuit tins, trays and racks, pans and buckets, confectionery, milk and fruit bottles, jam jars, lemon curd, mincemeat and malt jars, pudding bowls, pear-shaped ham containers, tongue and brisket moulds and containers, chocolate moulds, ice-cream moulds, etc.

Illustration shows one of our latest extended models specially designed for washing, de-labelling and rinsing returned biscuit tins, as supplied to

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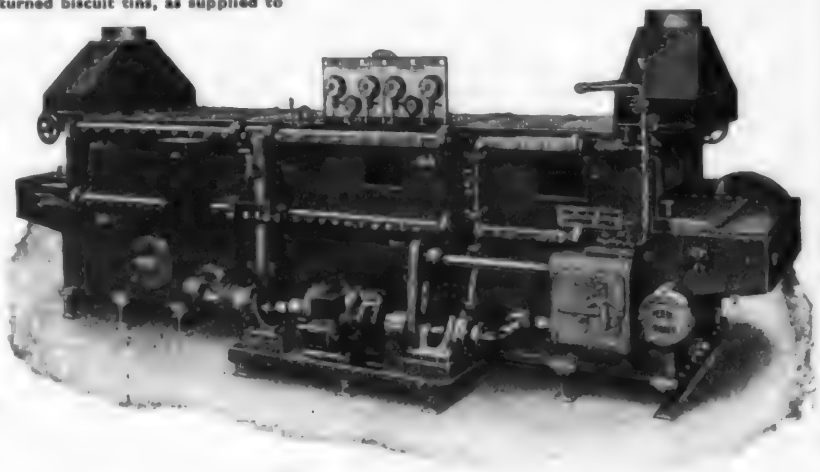

Illustration shows Standard Model, Type 18JJ
Specially adapted for washing and thoroughly cleansing the dirtiest class of returned jam jars, as well as new glass and stone jars. The machine illustrated has an output of 230 gross of 2-lb. dirty return jars per day.

Made in various types and sizes according to class of container to be handled and output required.

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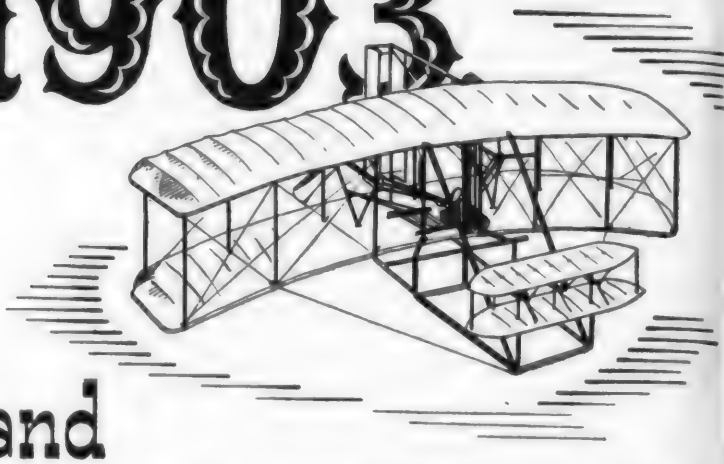
Saw the first flight by man in power-driven machines, when Wilbur and Orville Wright made a 'sustained' flight on December 17th, 1903. A remarkable achievement!



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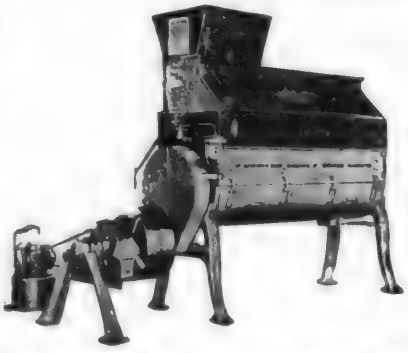
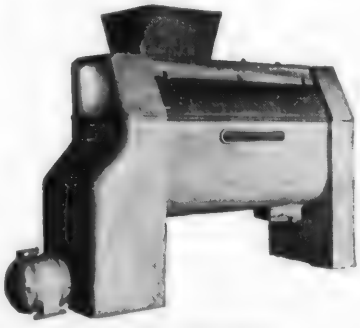


These machines are renowned for their long trouble-free working life. They operate at exceptionally low cost and can be handled by a minimum of labour.



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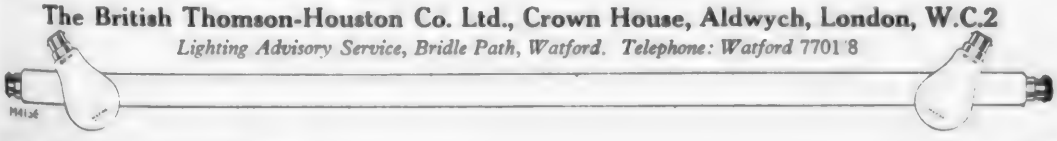

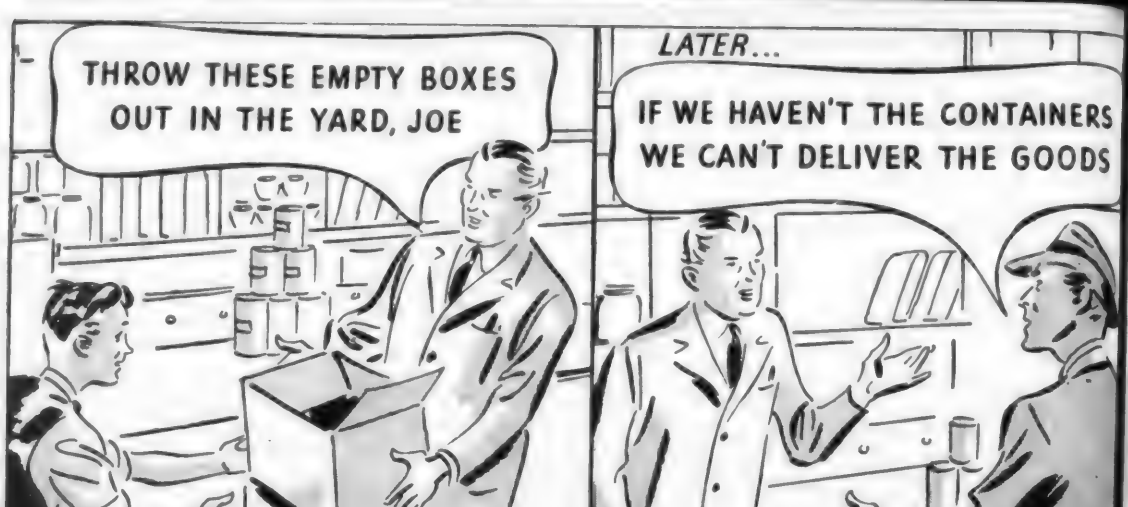

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This is not a threat, but a "straight-from-the-shoulder" fact. *Unless manufacturers have your returned containers, they can't give you the goods.* There is no alternative. And it isn't as if you have to go to much trouble, anyway. Just simply—don't give away containers, don't damage or destroy them, but put them aside for the C.R.S. van to take back. Vans collect during normal deliveries, and C.R.S. vans also make regular additional collections. Cash is paid on the spot.

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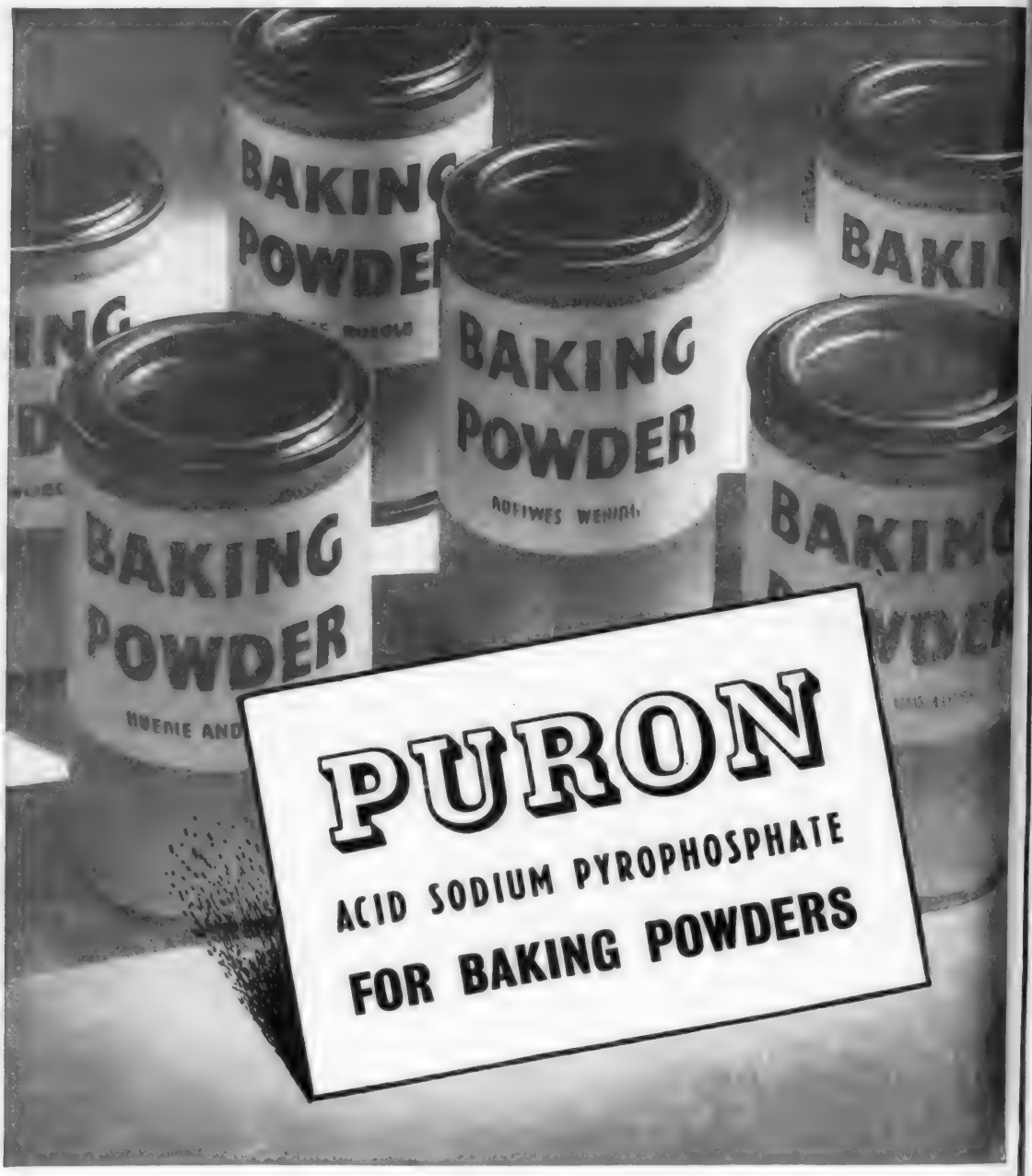

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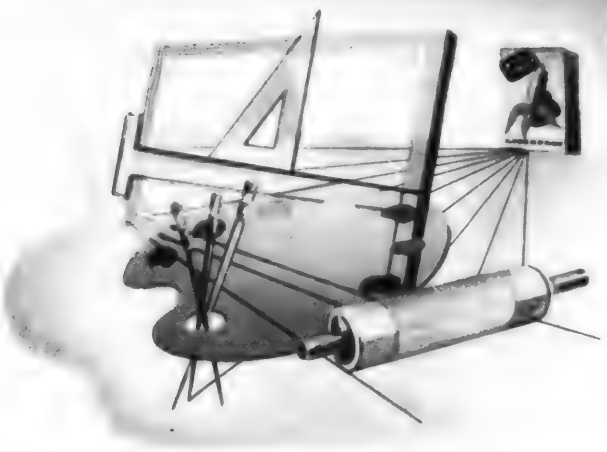

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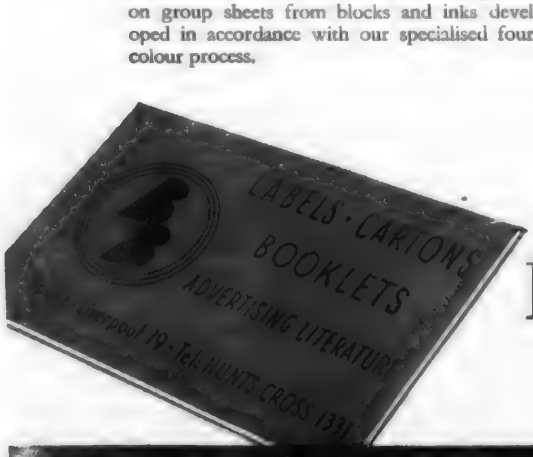

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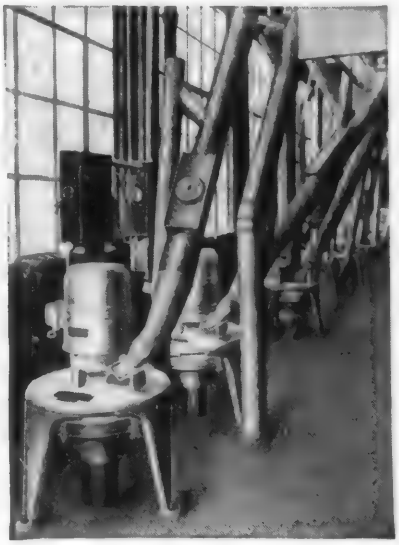

As a general principle Entoleter treatment should whenever possible be applied:

(1) to raw materials entering the plant; this ensures that they are uncontaminated when stored and cannot themselves spread infestation:

(2) to finished products immediately before packing; this ensures that they are dispatched free from any infestation they may have picked up during storage or manufacture.

It is usual to pass all flour and offal streams through Entoleters immediately after the final redressers; these should be installed as close as possible to the packing point in order to avoid any possible risk of reinfestation.

Insect life in freshly milled flour consists mainly of mites, eggs and very small larvæ. The Entoleter completely destroys these and positively prevents the development of subsequent infestation from within the flour itself.

Entoleter treatment is particularly important when flour is stored in bins, for bulk storage offers the most favourable conditions for insect life to multiply and become a menace to the whole mill.

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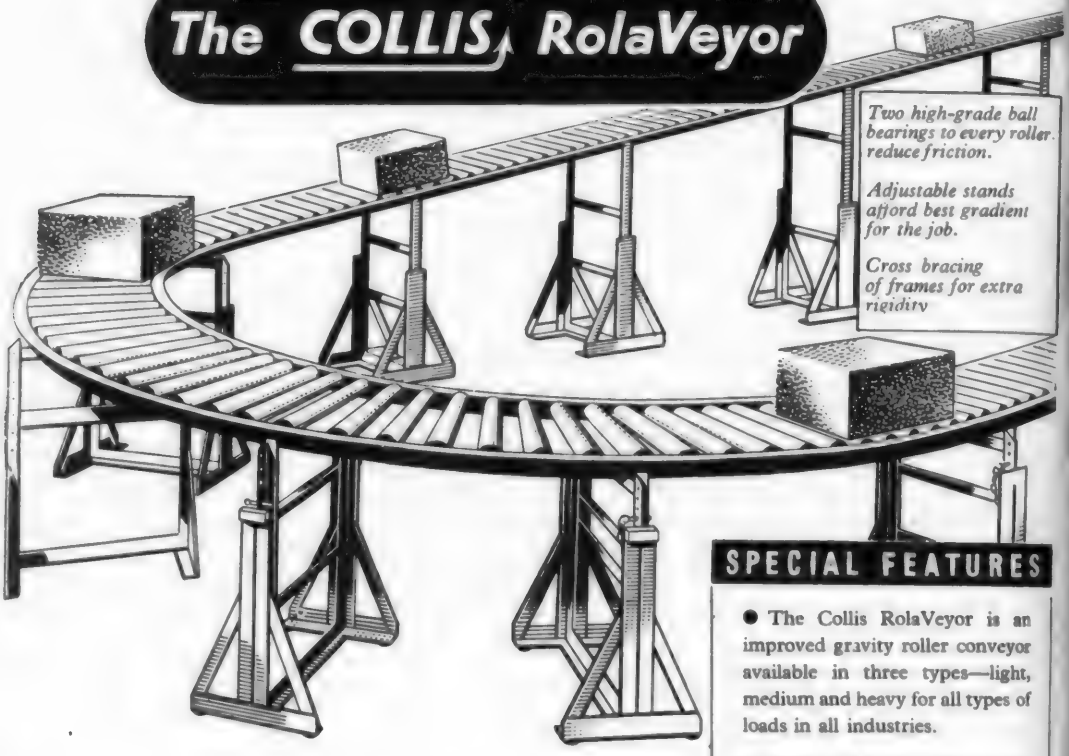
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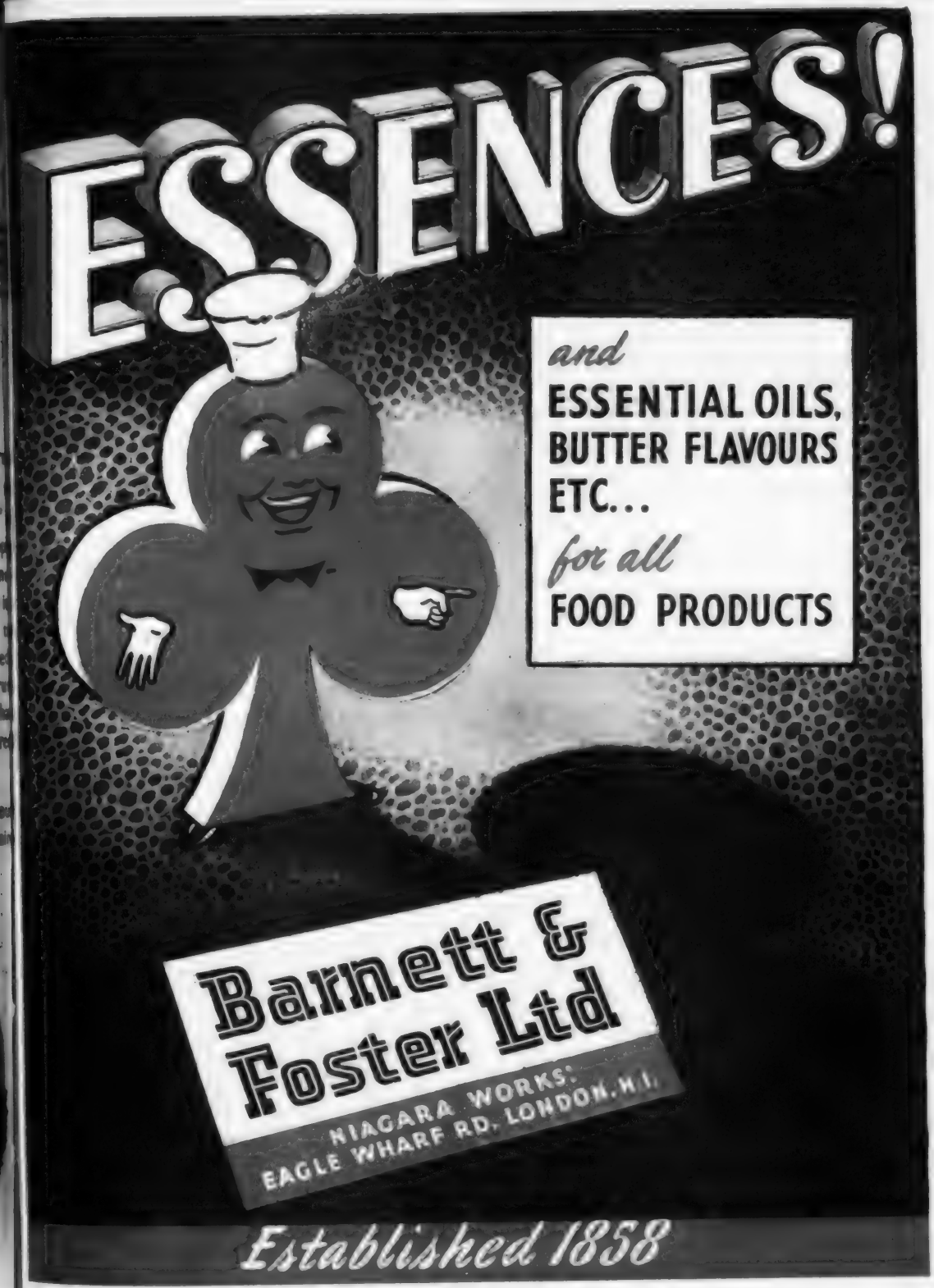
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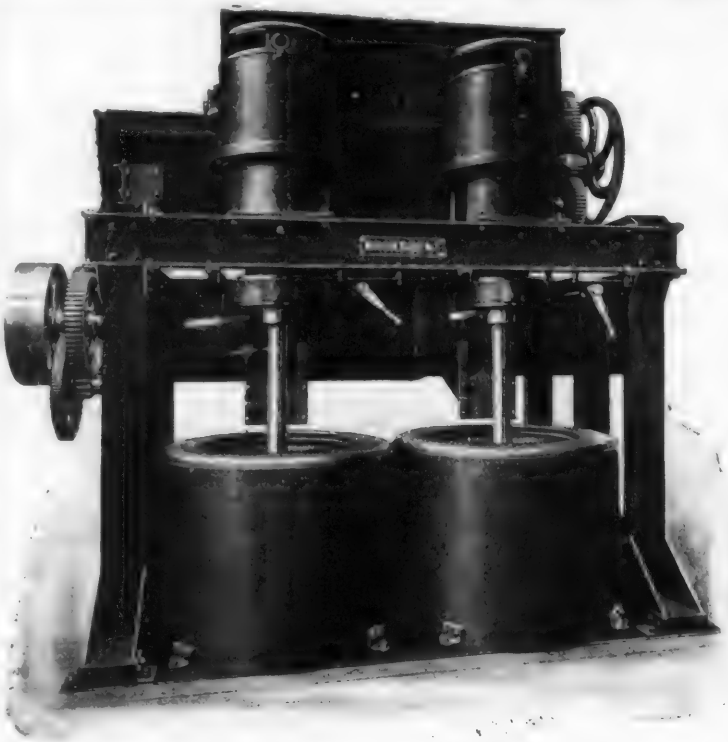

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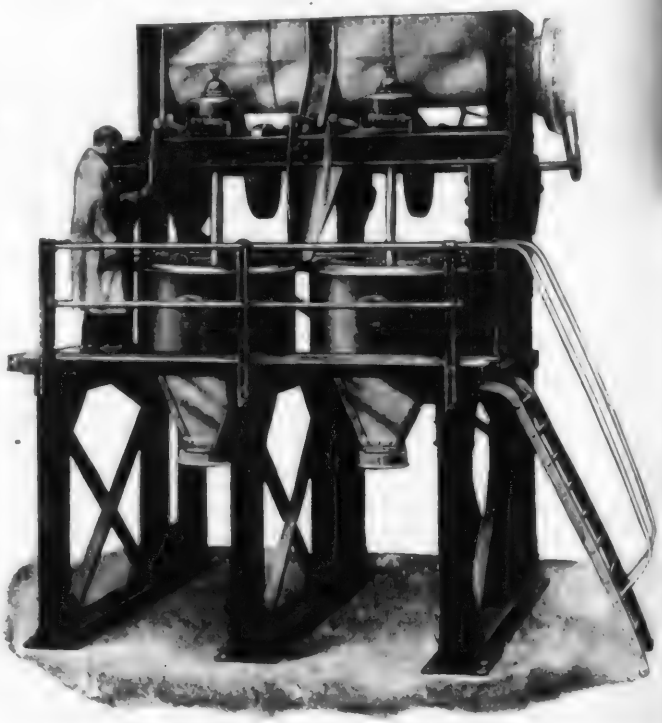

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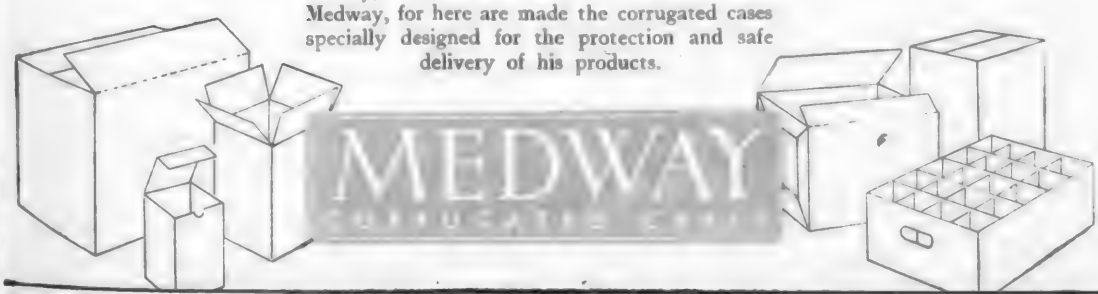

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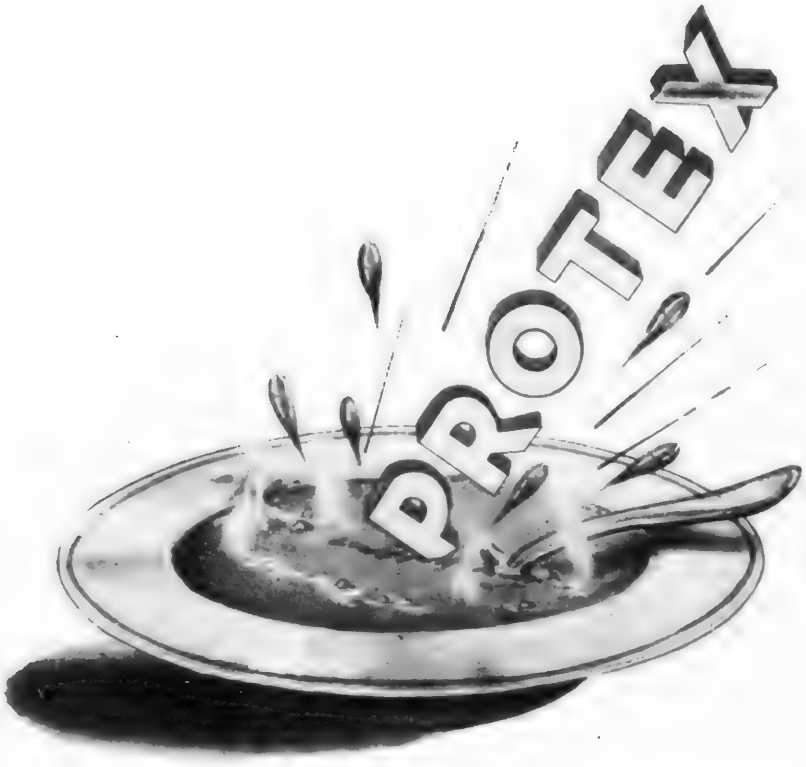

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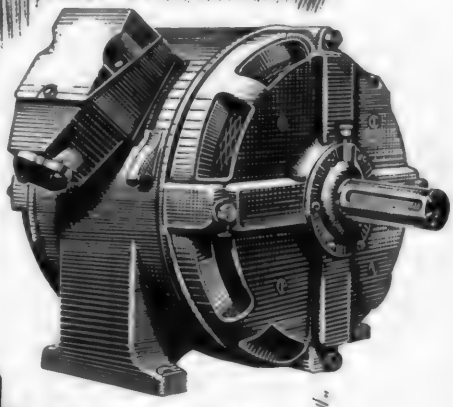

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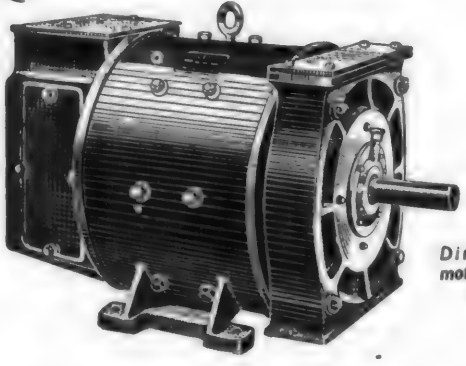

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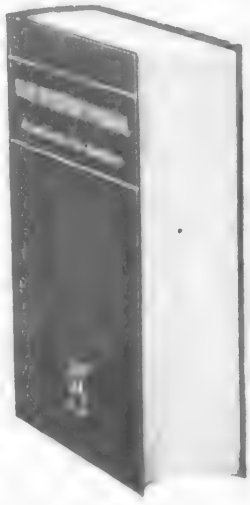

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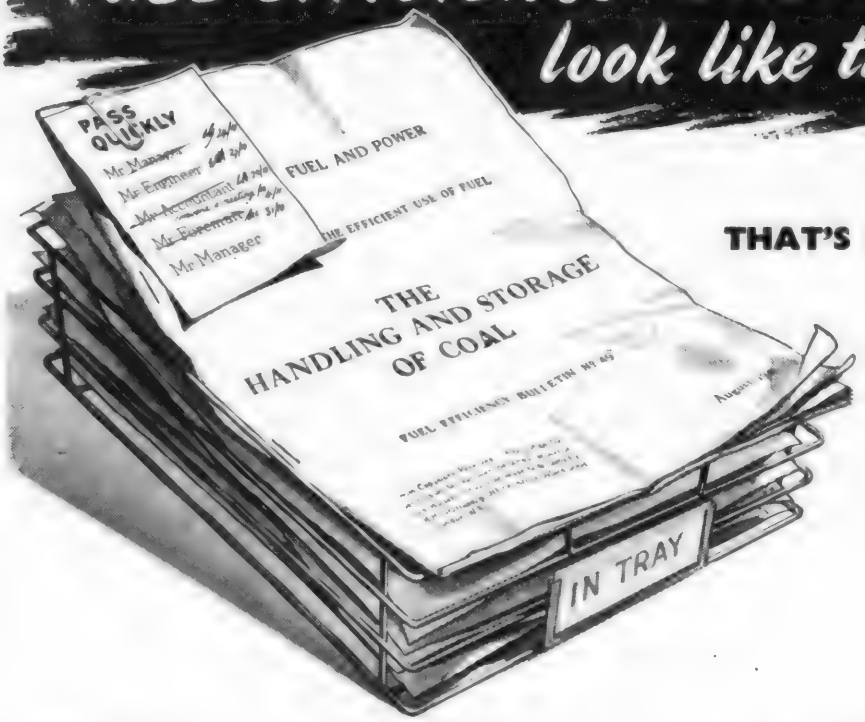

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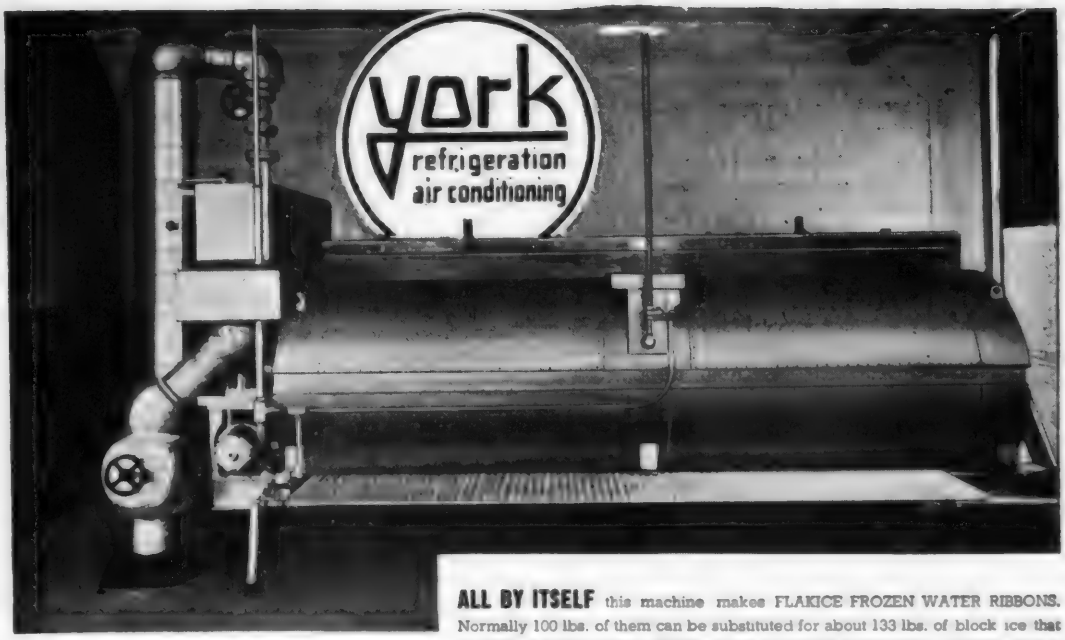

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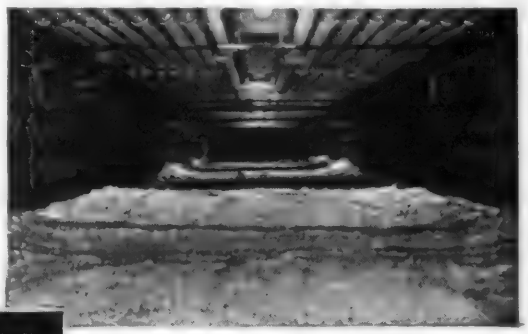

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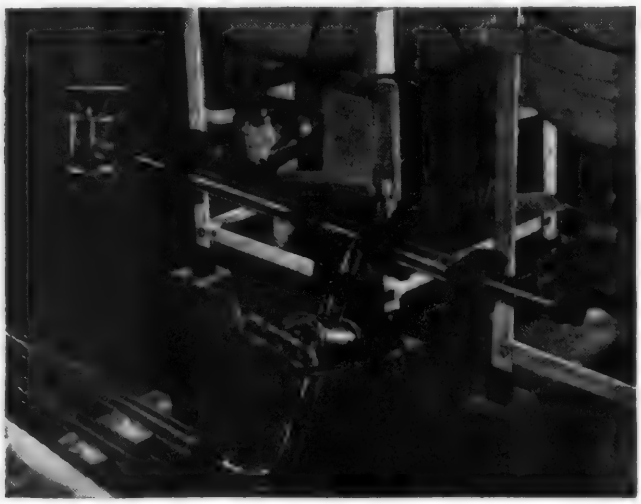

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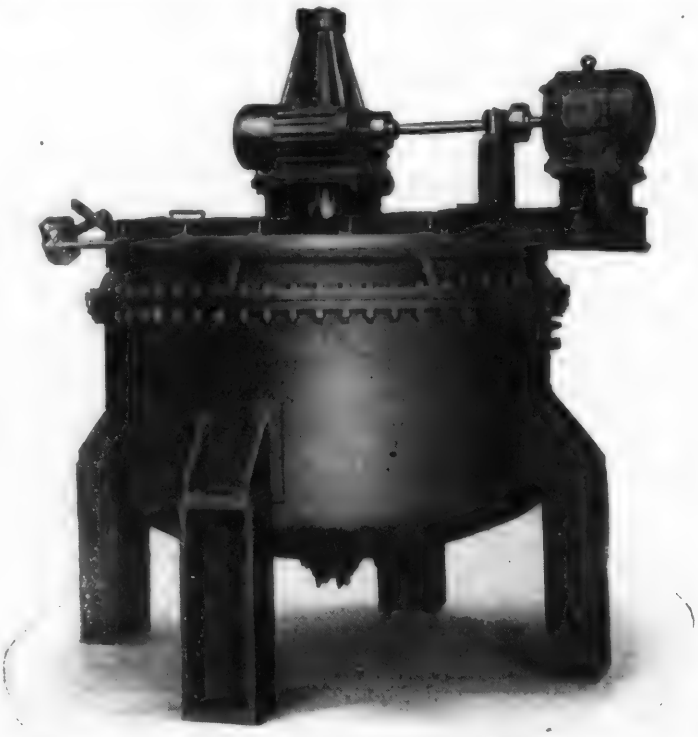

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Highly Acid Resisting.
Cast Iron or Mild Steel.
Capacities up to 1,000 Gallons.
Motorised or Belt driven.

Established over a Century and a Half.

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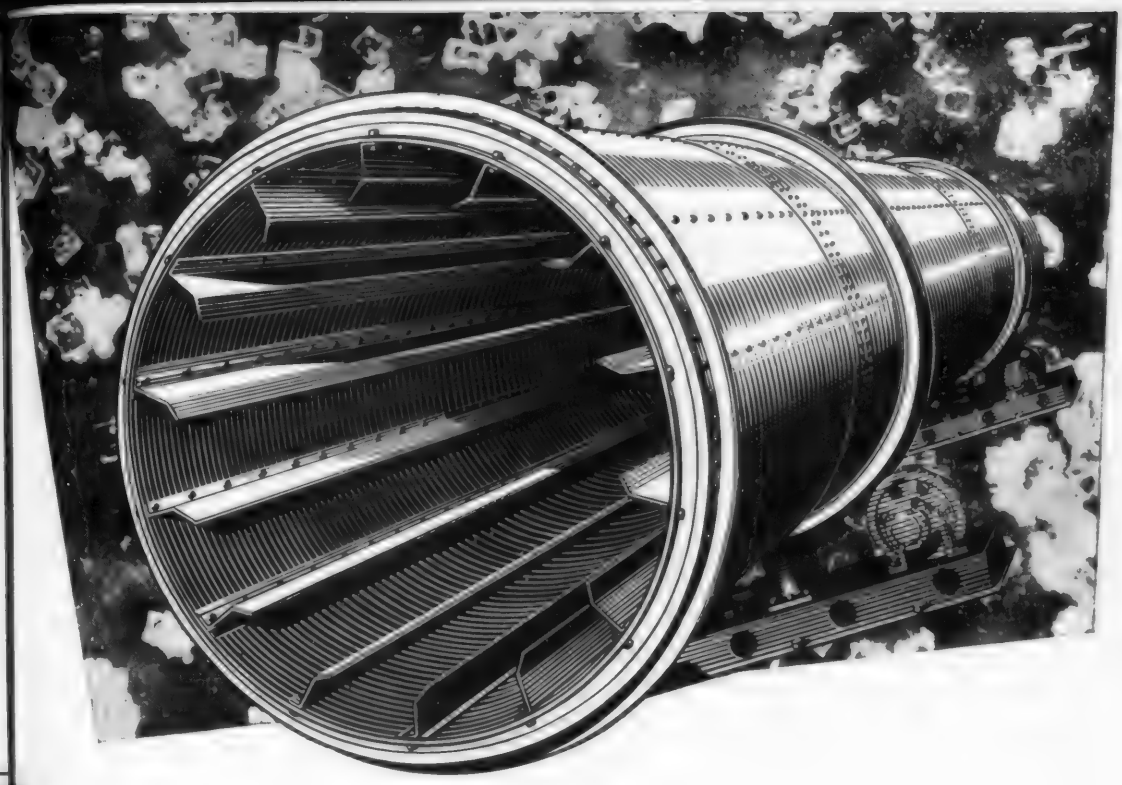

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No need to take this with a grain of salt — Monel can handle tons of it. And handle it too, without suffering from corrosive or abrasive attack.

In fact, wherever corrosive conditions from salt, brine, steam or food acids occur and a high strength material is required, Monel should be specified.

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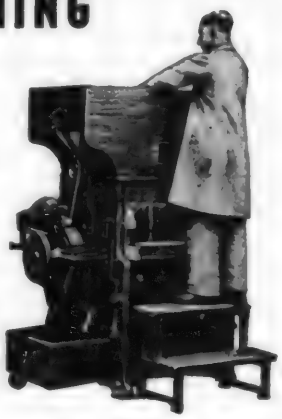
is a modern method designed for extracting dirt and foreign matter and at the same time leaving the article in its ***original*** form and retaining its ***entire*** properties.



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This is exactly what the

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does.

It takes from **Currants** and **Sultanas** the STALKS, DIRT, DUST GRUBS and NAILS leaving the fruit with its ***original*** bloom and its ***entire*** sweetness.

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WOVEN WIRE CONVEYOR BELTS

Wedco

MECHANICAL HANDLING EQUIPMENT

"Wedco" conveyors, incorporating "Wedco" Woven Wire Belts are the answer to many of the handling problems of the Baker and Confectioner.

The illustration shows a "Wedco" Woven Wire Conveyor Belt carrying dough from the proover to the baking ovens.

Whatever your handling problems, you will be interested in our catalogue, available through the coupon below, and our Technical Service Department will be able to tell you whether "Wedco" belts and conveyors can help you. The fullest information is available without the slightest obligation.

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Telephone : Warrington 663 and 1676
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To
THE BRITISH WEDGE WIRE CO. LTD.
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PIN THIS TO YOUR CARD OR LETTERHEADING

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No pumphouse? No foundations? All pipework underground? No driving shaft, bearings or gears to bother with? Loss of power is negligible? Nothing at the wellhead? No installation difficulties? No priming needed? No suction troubles? No noise? No radio interference? No attention for upwards of 10,000 hours? *What kind of pump is this?*

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SUMO Pumps are used to-day by waterworks, gasworks, factories, hospitals, schools, Government Departments, railways, dairies, laundries, farms and private owners all over the country. There are models to cope with any output between 200 and 40,000 gallons per hour. Initial costs, running costs, maintenance costs . . . all low. SUMO Submersible Pumps have revolutionised water-pumping methods—and behind them is the hundred-year engineering name of Chance Brothers.

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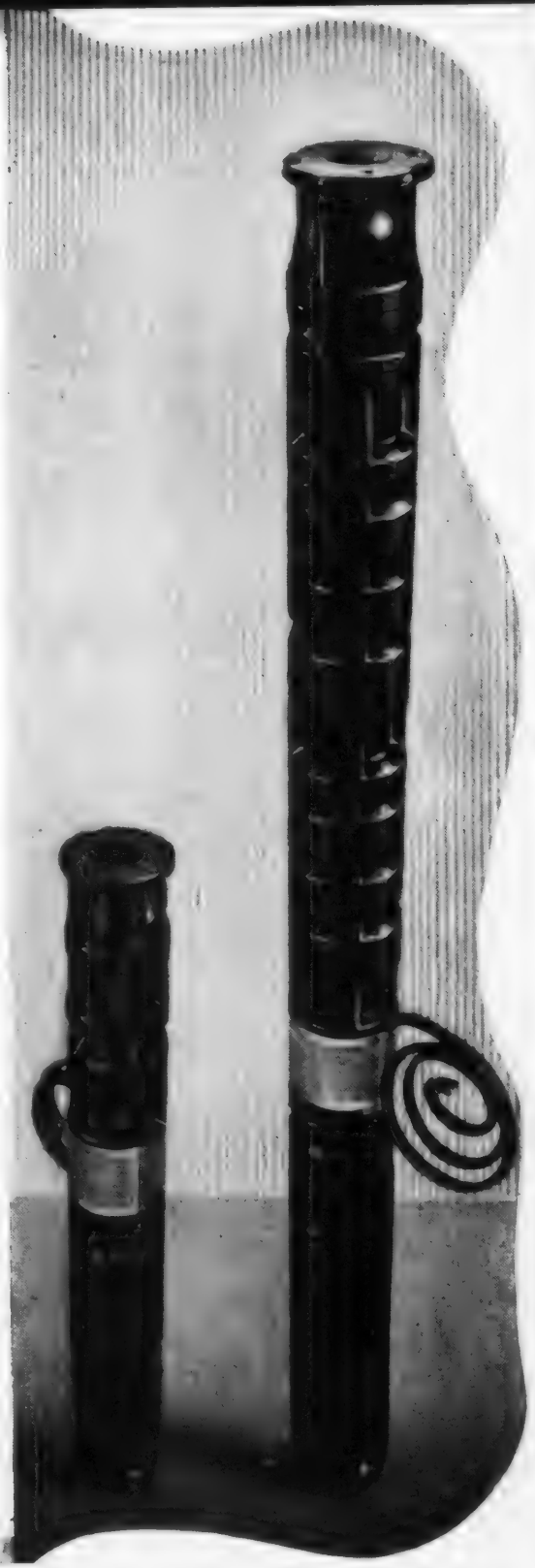

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Riboflavin (B_2)	1.45	,, ,,
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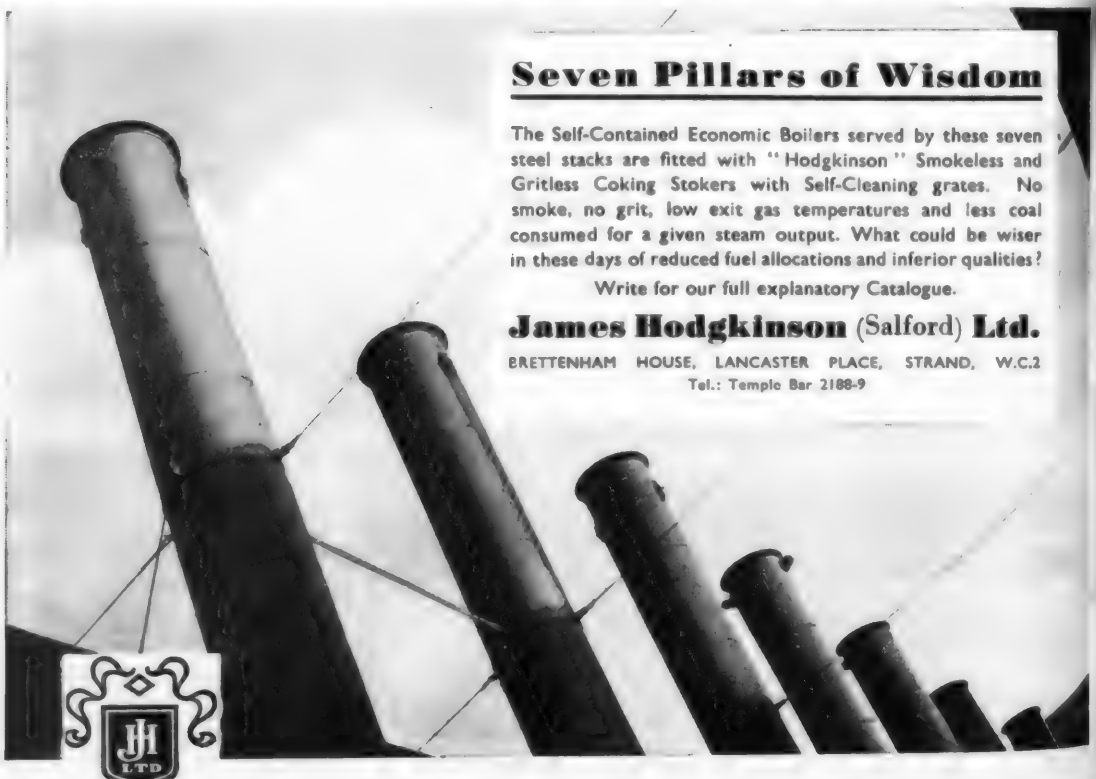
THE ENGLISH GRAINS CO. LTD. BURTON·ON·TRENT



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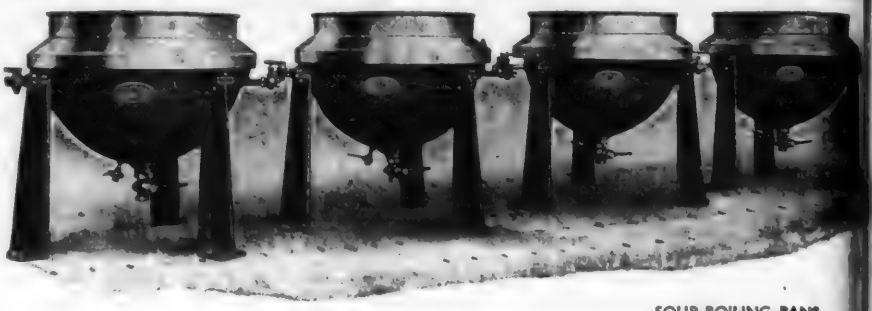

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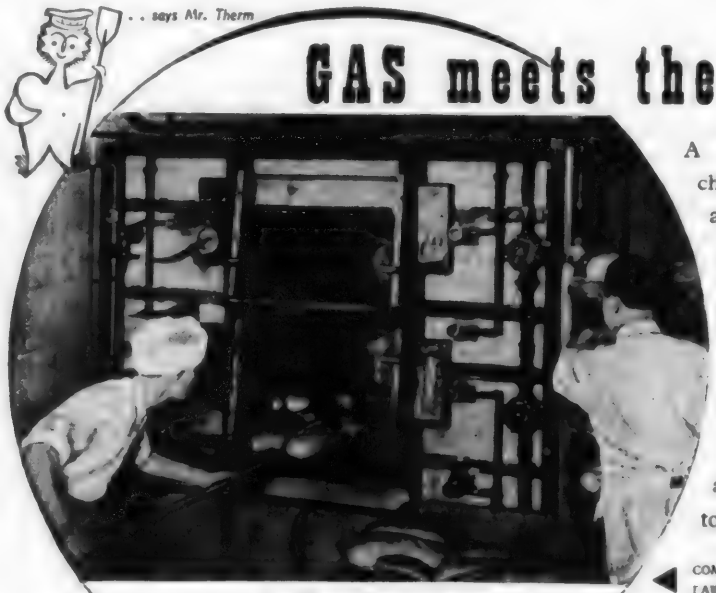
GAS meets the NEW need



A flexible fuel, quickly adaptable to changing conditions of labour, rationing and raw materials, eases many a problem in the bakery. That is why more bakers are planning to install gas as soon as circumstances permit. Gas is clean, economical, accurately controlled . . . gives quick starting-up and a trouble-free close-down. The versatile burner and the handy gas tap will meet tomorrow's need.

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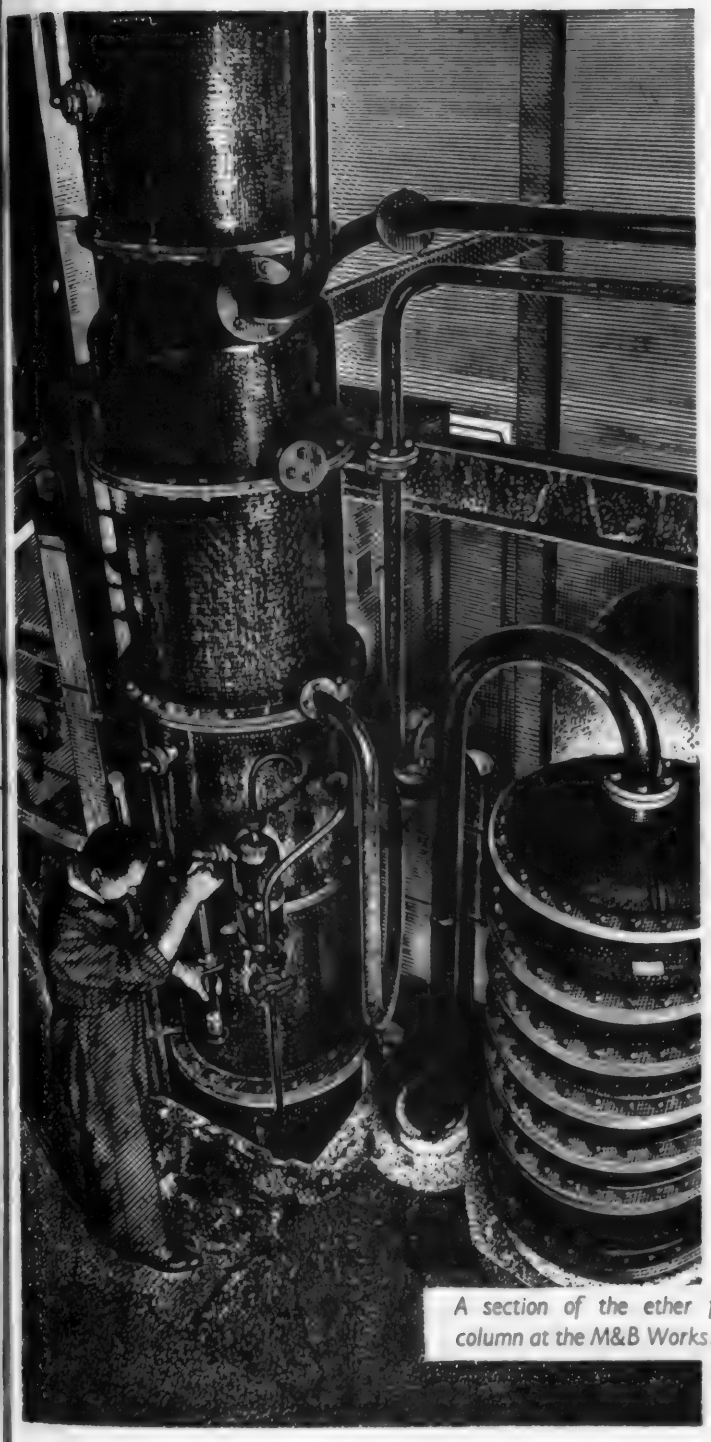

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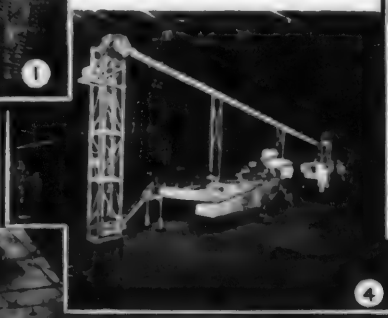

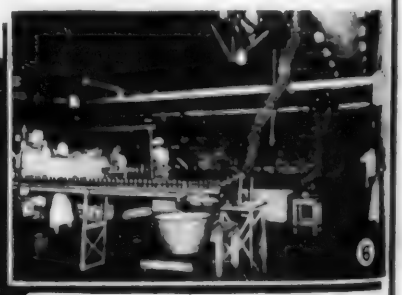

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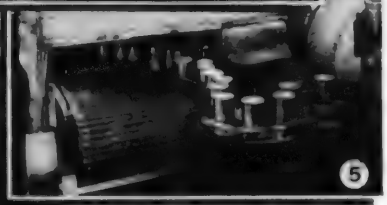

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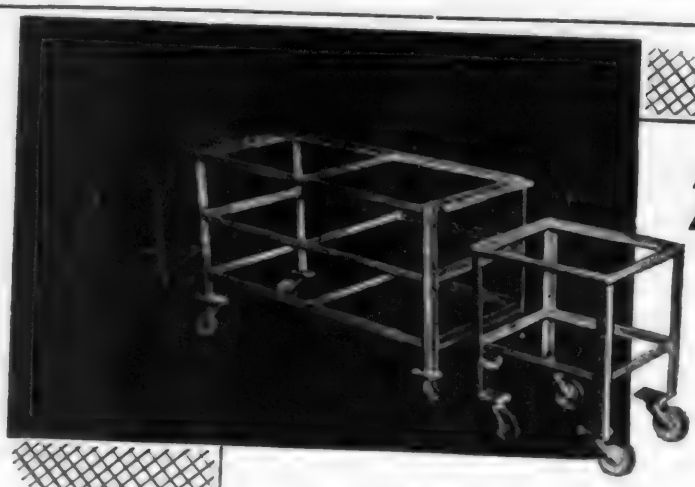

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Our wide range of products for the Food Industry includes Jacketed Pans, Vacuum Pans, Processing Retorts, Storage Tanks, Trolleys, Food Benches and Racks.
We design and manufacture to customers' requirements and specifications.

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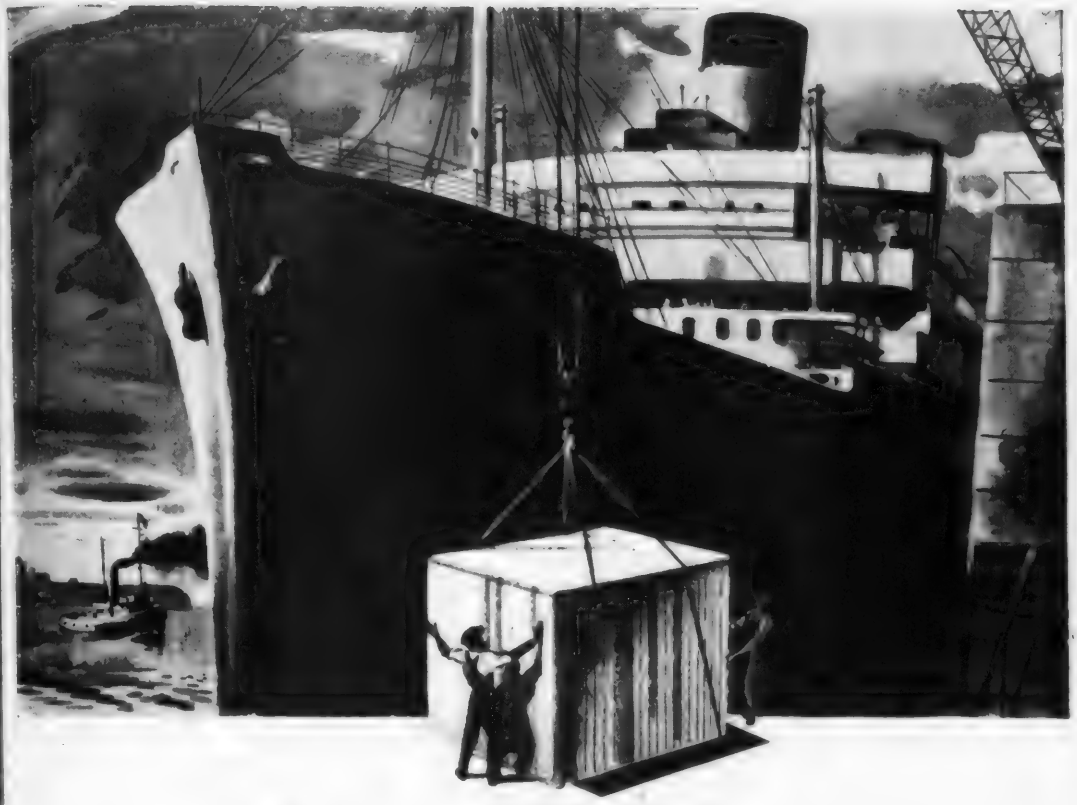
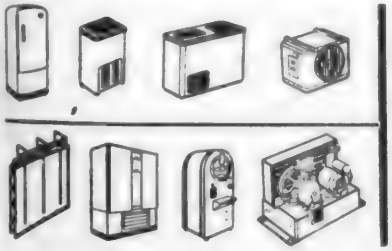


FOOD - HANDLE WITH CARE

In the fight for the nation's food, electric refrigeration plays a major part. For without its benefits, our present rations could not be maintained. Frigidaire is helping the nation to win through by safeguarding perishable food and preventing waste. In cold stores and kitchens all over the world — wherever dependable refrigeration is needed — you'll find Frigidaire on the job.



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DIVISION OF GENERAL MOTORS LIMITED
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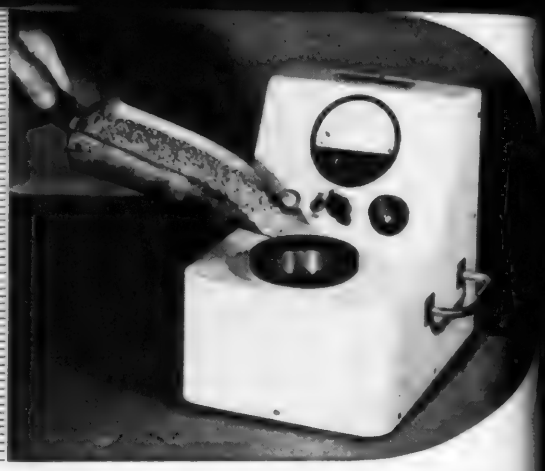
COMMERCIAL AND HOUSEHOLD REFRIGERATION

ONE GLANCE AND YOU KNOW...



You fill the container as shown, glance at the dial and get an immediate check upon the moisture content of grain, seeds, peas or whatever similar foodstuffs you may be examining.

This compact, portable, self-contained electrical moisture meter has been developed by N.P.L. in conjunction with Baldwin Instrument Co., Ltd.

The aim was to make available to Grain & Seed Merchants, Grain Dryers, Food Manufacturers, etc., a simplified and rapid means of moisture determination.

Anyone can use this instrument : one simply ob moisture content by referring the meter reading calibration chart.

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Fully descriptive and illustrated leaflet on request

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Gosheron's tape in the ANTARCTIC

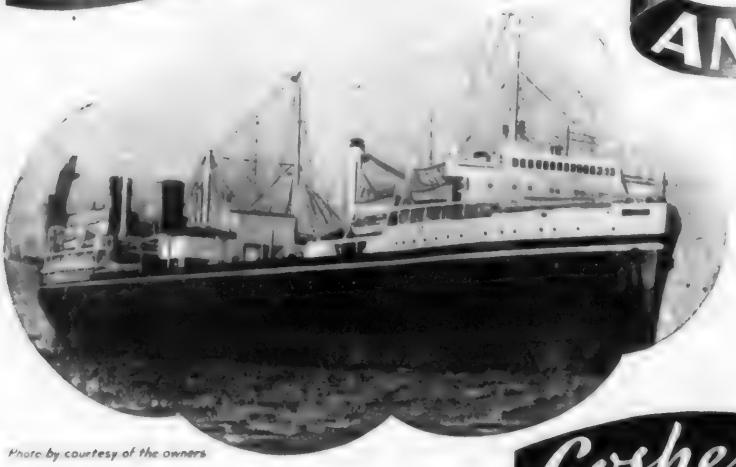
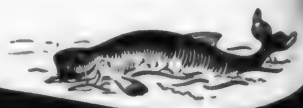


Photo by courtesy of the owners

The new wonder ship, F/F Balaena, takes on board Transotape for sealing packages of whale liver extract processed at sea.



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self-adhesive cellulose tape

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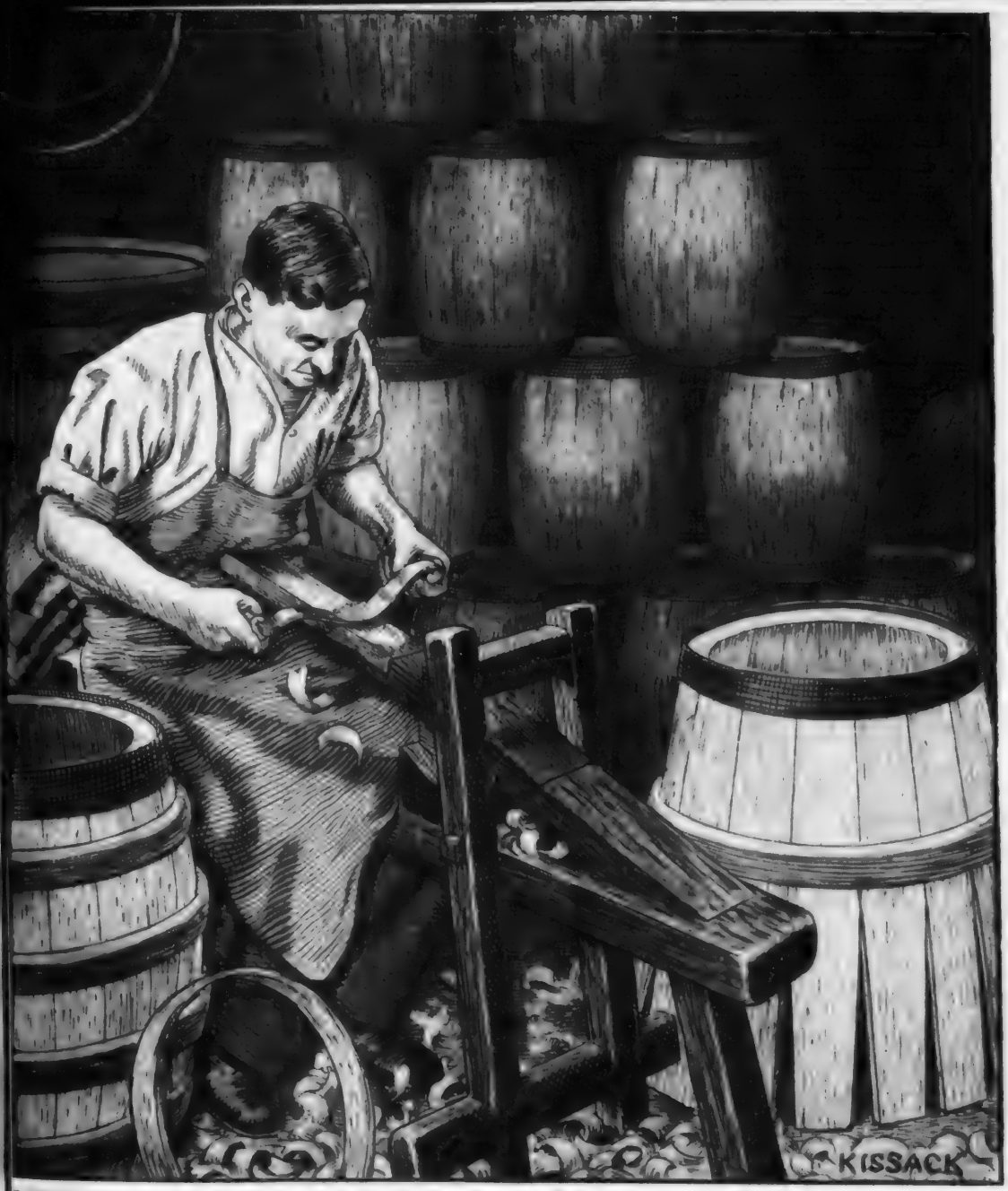

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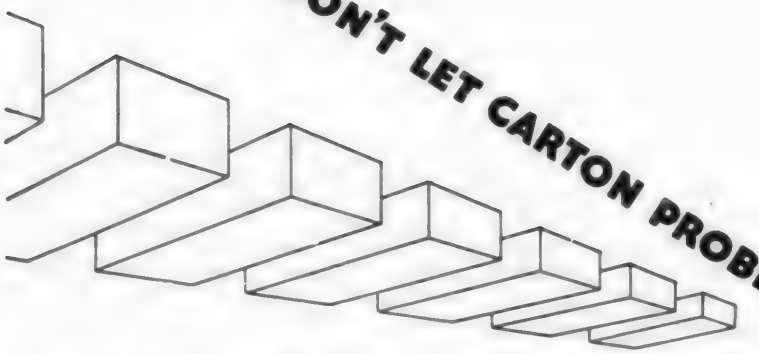
"Magcrates"
FOR LIGHTNESS & STRENGTH

DON'T LET CARTON PROBLEMS



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Now is the time, before you swing into full peace-time production, to get your packaging situation lined up. It will never become a problem—if you tackle it now. Probably you have already some ideas of the form your containers should take. We have a brilliant creative studio ready to put your thoughts, or their own ideas, into tangible form.

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Yes—this is the "boilerhouse" of a well-known dyers and cleaners . . . All the steam they want, no chimney, no fumes, no fuel store . . . absolutely clean and spotless.

B & A electrode boilers have unique advantages: they can be put in any convenient position, without any guard, and often beside the machine using the steam, saving pipework and steam losses. B & A boilers are the most convenient sources of heat available and require no attendant.

B & A electrode boilers are available for steam supply and for space heating and hot water supply. Write for full details.

250 Kw. electrode boiler supplying 750 lbs. steam/hr. for leading firm of Dyers & Cleaners.

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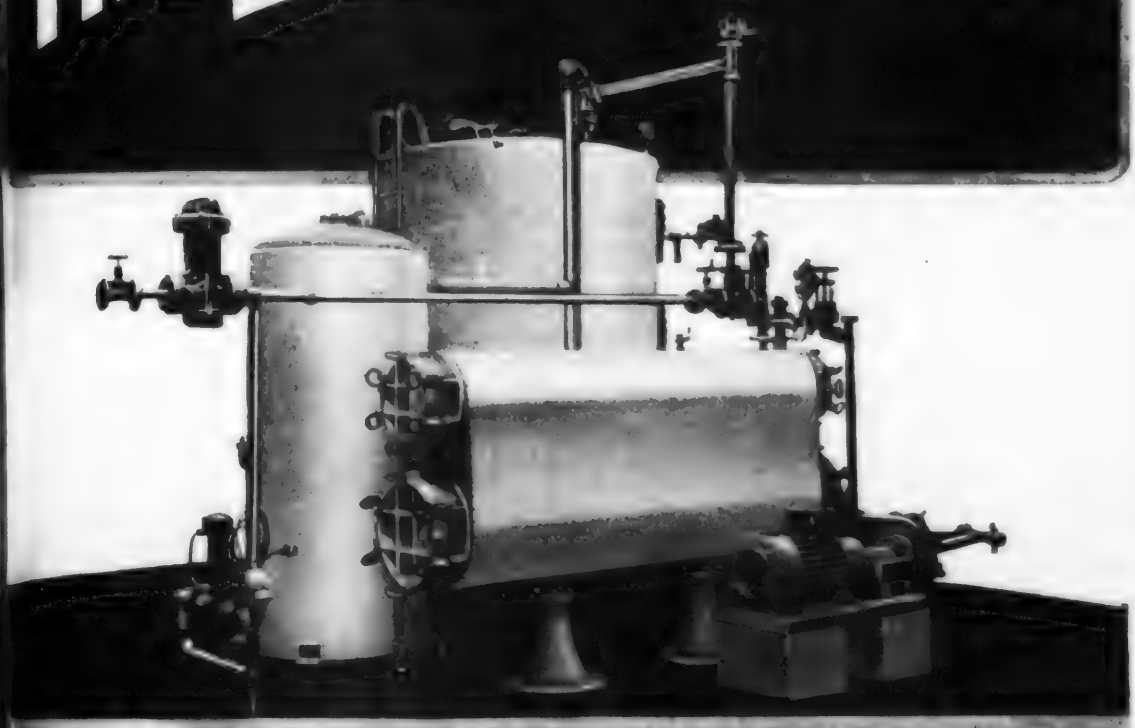

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as installed in Evaporated & Sweetened & Condensed Milk Factories

s rapidly replacing other types in use due o the ease of cleaning, accessibility to the eating units and the short contact in time with the heating medium.

There are complete 'BENNETT' Processes for Evaporated Milk, Sweetened and Condensed Milk, Whey Paste and Powder, Malt Extract, etc. Many repeat orders.

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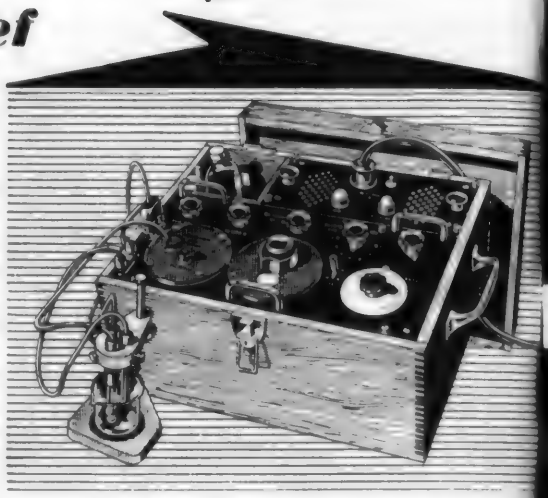
pH

A watching brief

DETERMINATION

MARCONI pH METER TYPE TF 717A



In many industrial plants even unskilled personnel hold a watching brief over the necessary, but time-wasting measurement of pH. By the use of the Marconi pH Meter, readings correct to .02 pH are obtained without involving complicated calculations. These meters, mains- or battery-operated, can be used either for routine works tests or laboratory experiment. So successful have they proved in operation that they are now regarded as essential to exact process control. If you would like to know more about Marconi electronic measuring instruments for industry, *write for full particulars.*

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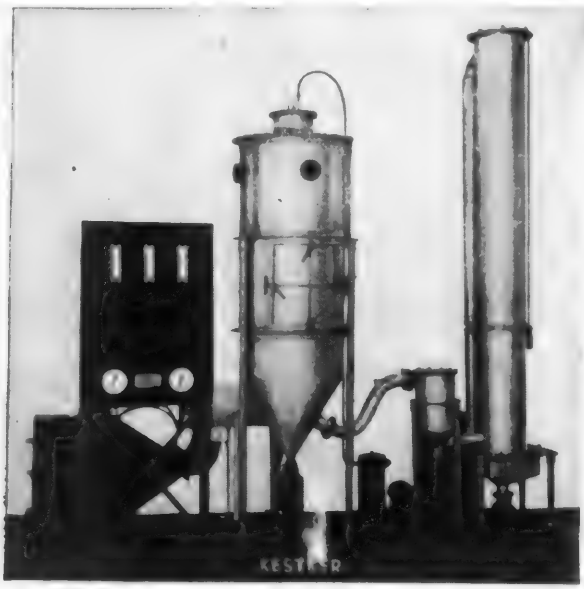

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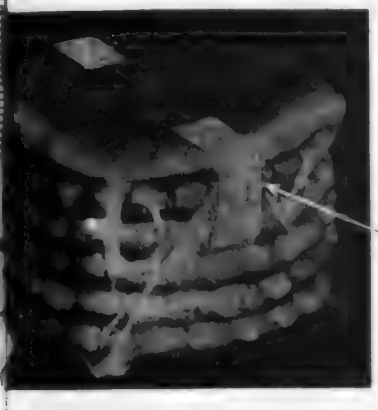

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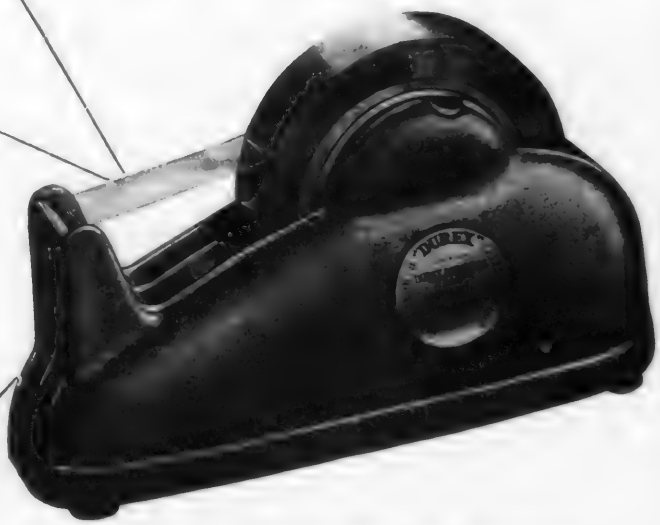

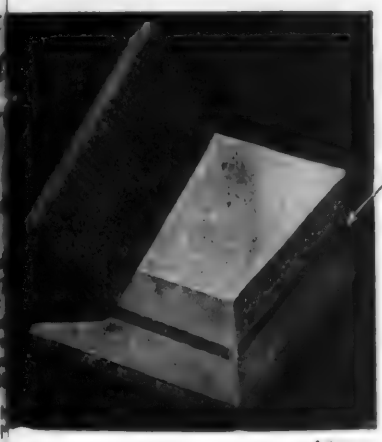

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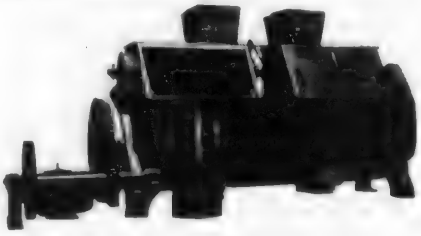

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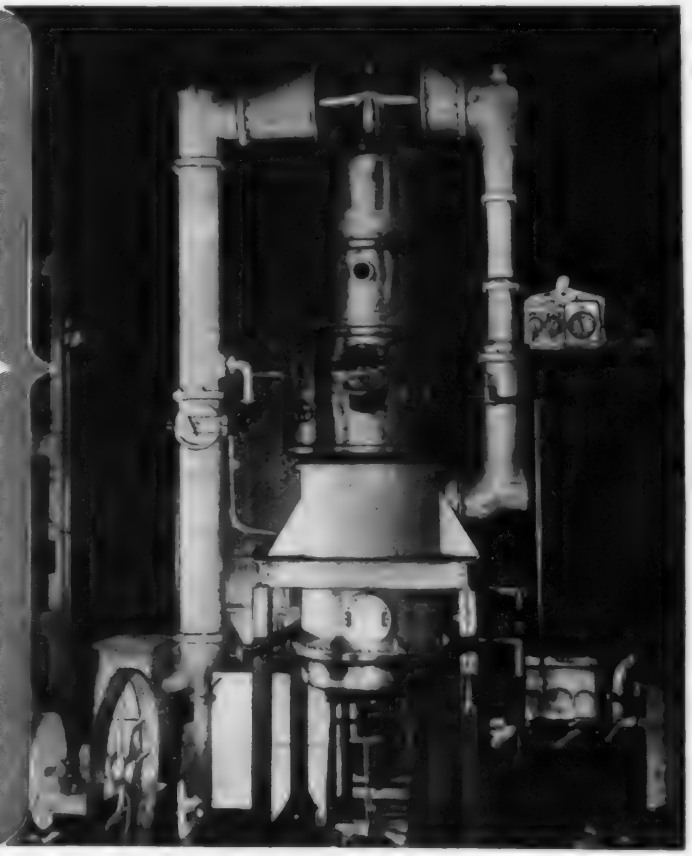

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FOOD MANUFACTURE

Vol. XXII. No. 12 · Published Monthly · December 1, 1947

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SMOOTH CONTOURED
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RANGE FROM 30°C.—300°C.

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AVAILABLE IN 8/12 WEEKS

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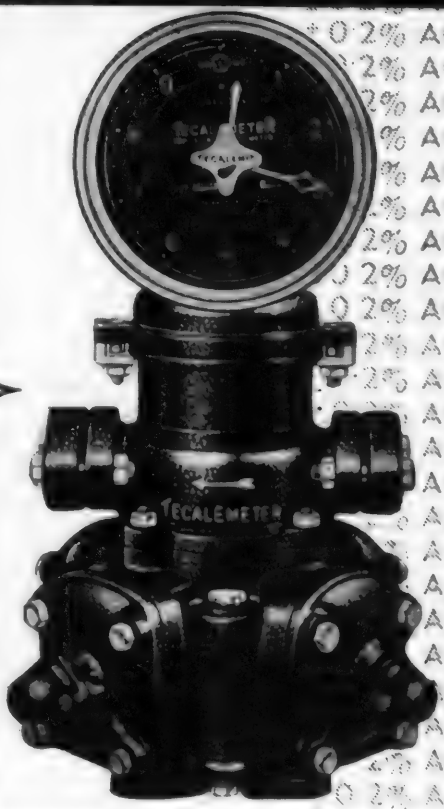

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GENUINE BILBERRY, RASPBERRY, REDCURRANT, CHERRY & BLACKCURRANT JUICES

CONTAINING 65% ADDED REFINED SUGAR

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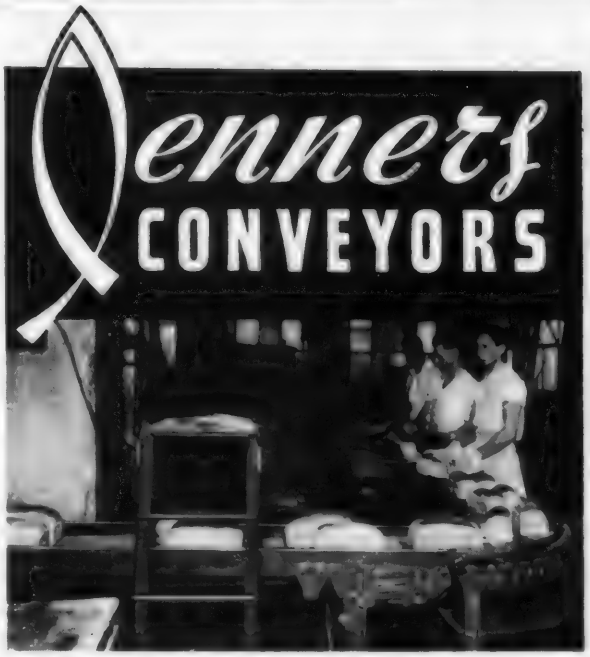

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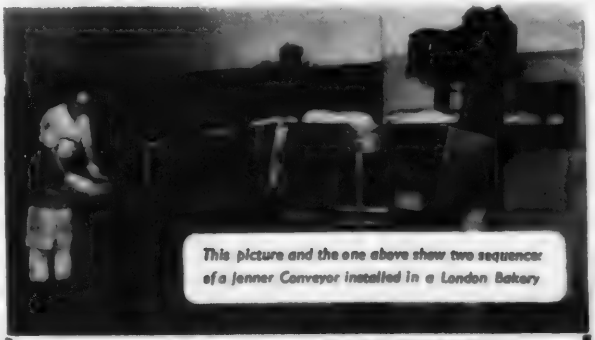

This picture and the one above show two sequences of a Jenner Conveyor installed in a London Bakery

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Carriage Paid.

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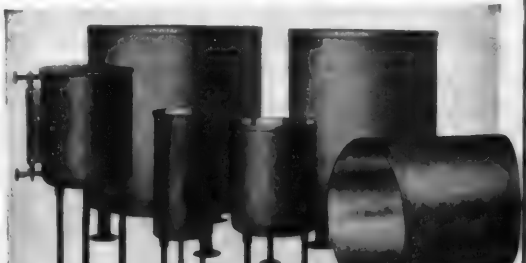

IN STAINLESS STEEL

The containers illustrated are typical of the non-corrosive, hygienic and easily cleaned equipment made by us for the Food Industry.

Fitments of all kinds, containers, utensils, etc., made to requirements in light or heavy gauge

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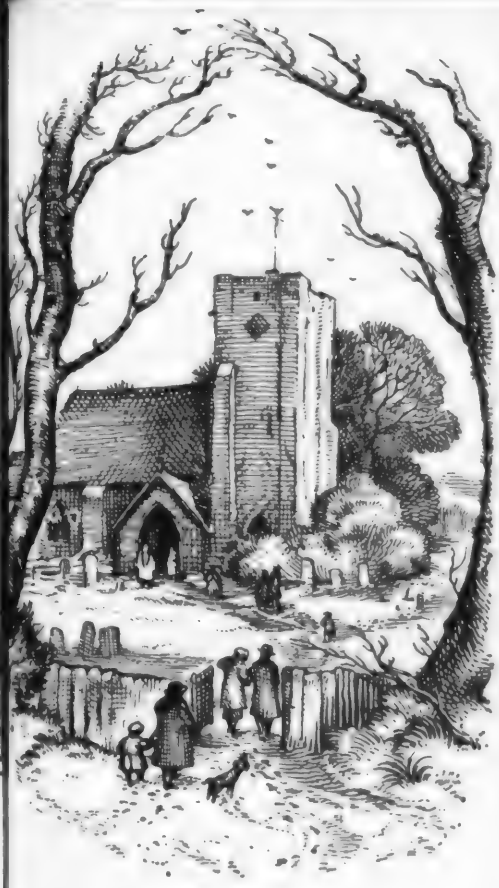

December

December is balance month. The last few days of the year make heavy demands upon the staff of the bank, for every account is "balanced" and checked. Modern office methods, involving the use of mechanised book-keeping systems and of photographic records in accountancy, have reduced the time spent in searching for the proverbially elusive penny, but even so, hard work by every officer is required at "balance time". You will soon have an opportunity of studying the balance sheet of the Midland Bank; it is clothed in conventional form, but behind its figures lies the story of great achievements for customers large and small.

MIDLAND BANK LIMITED

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Long Lasting under hard conditions

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Ask for PYREX Brand and see that you get it!

JAMES A. JOBLING & Co. Ltd.
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The Perfect Closures for Cellophane and Paper Bags

REPLACEABLE—EFFICIENT—NEAT

Specimen Prices per 1,000

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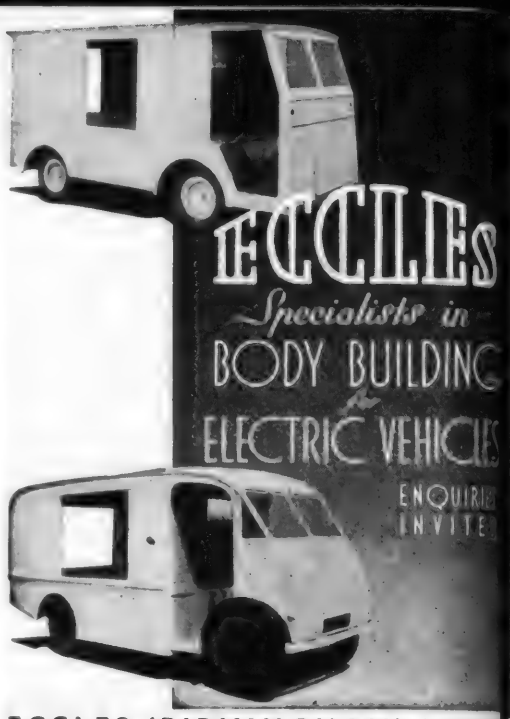

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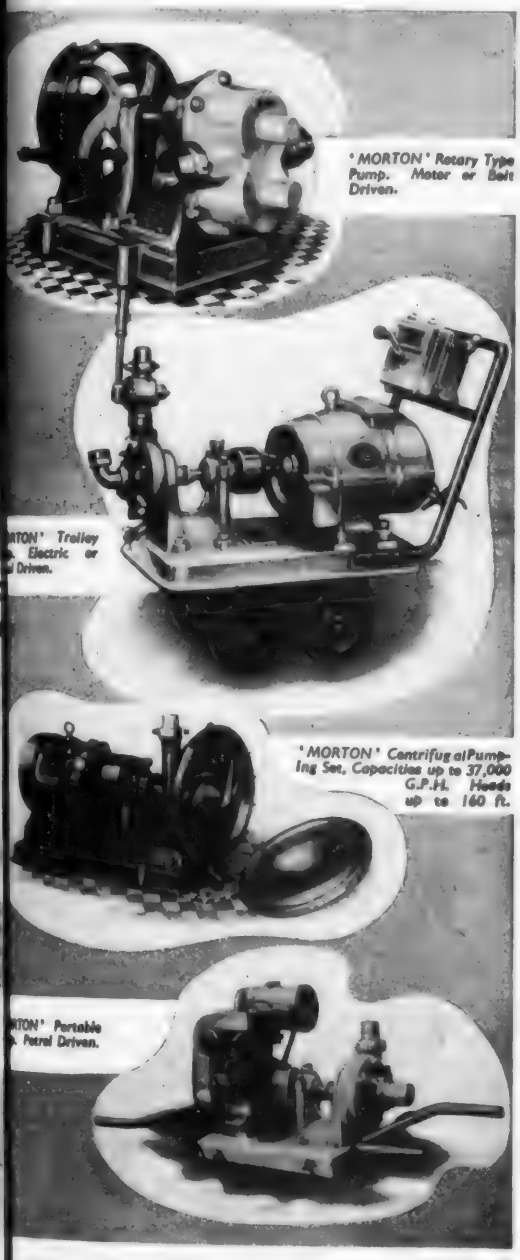

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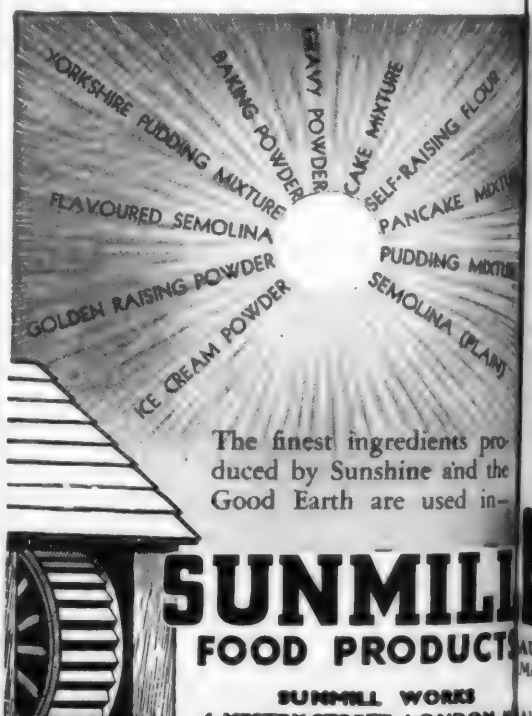

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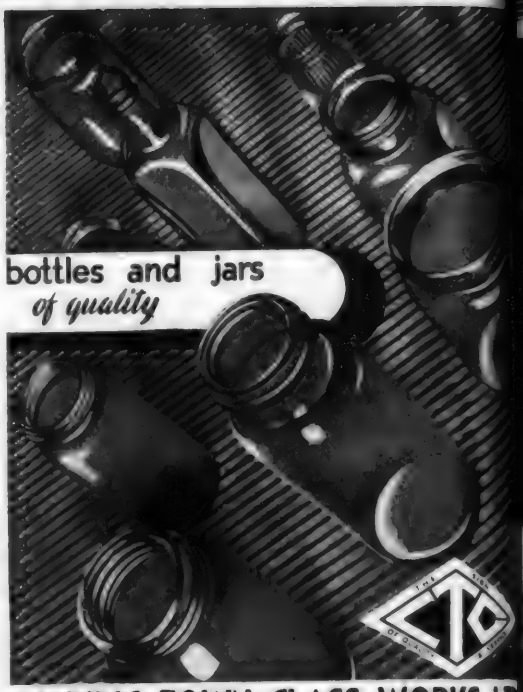

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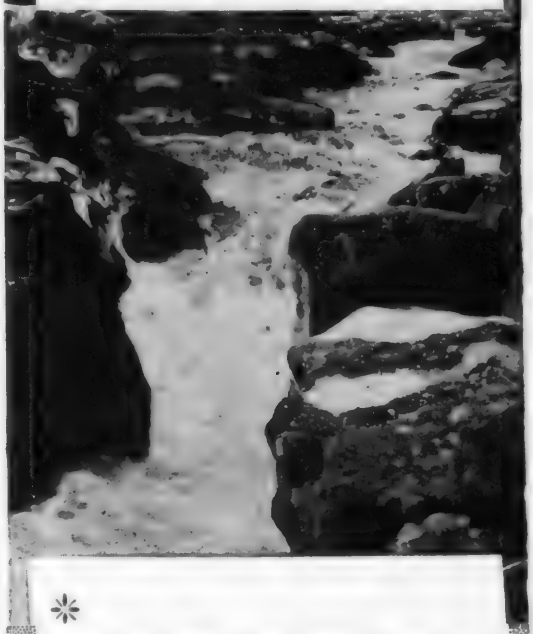

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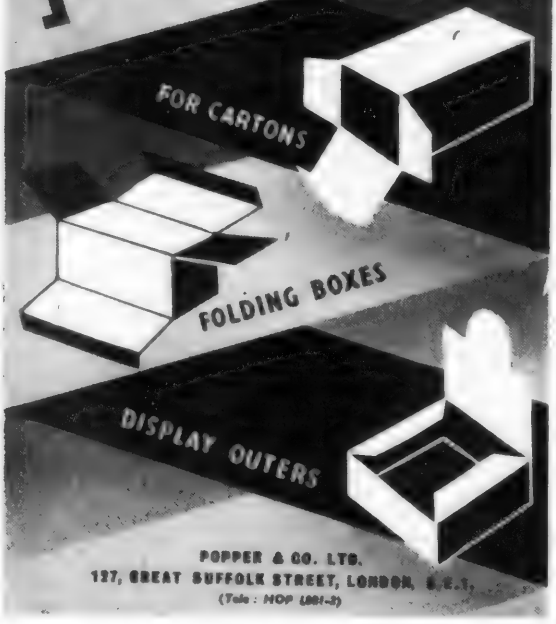

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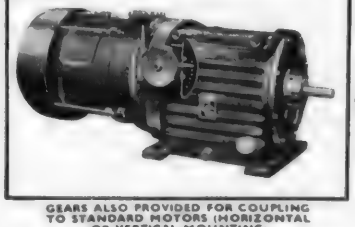

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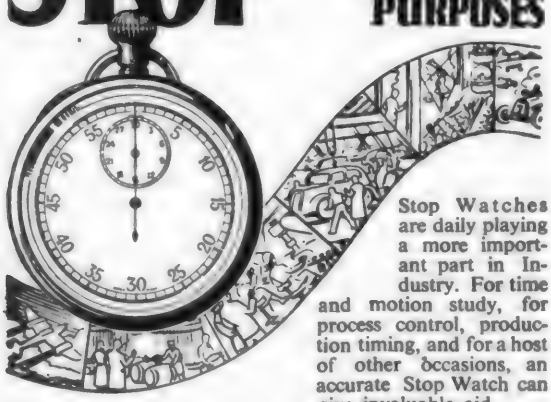

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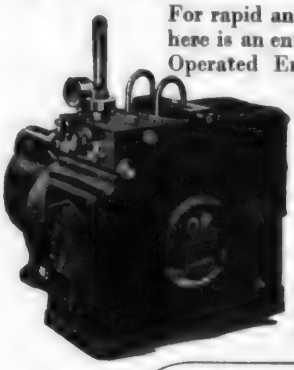

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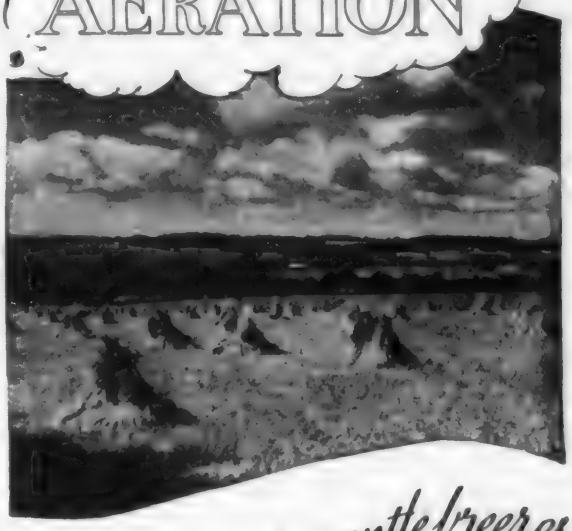

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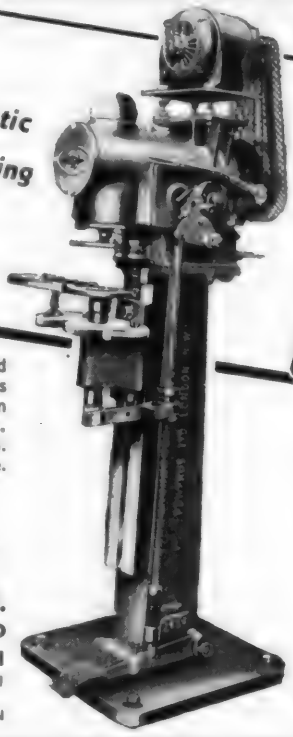

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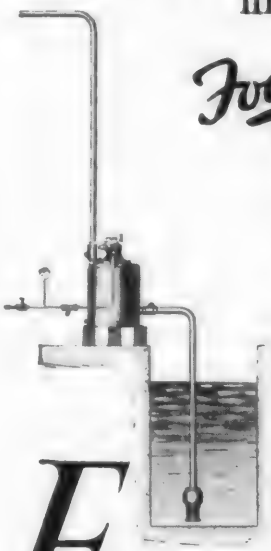

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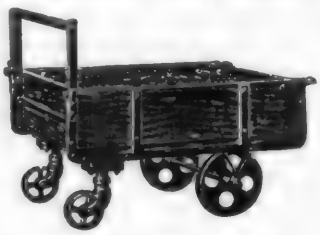

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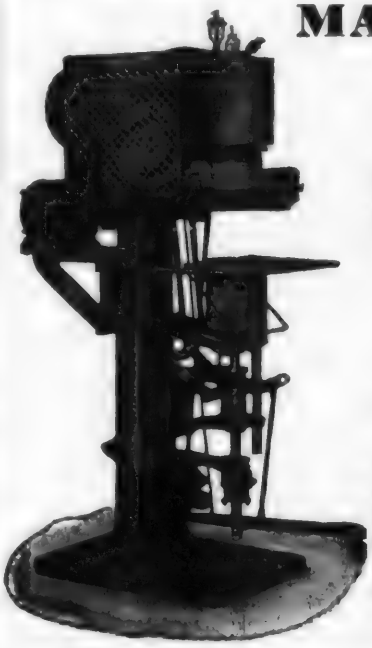

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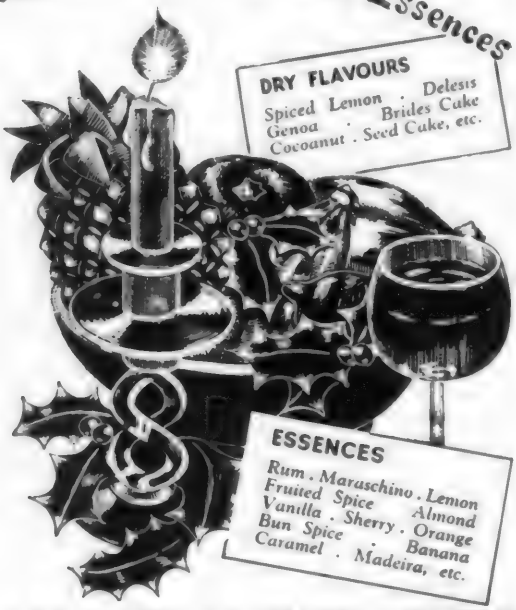

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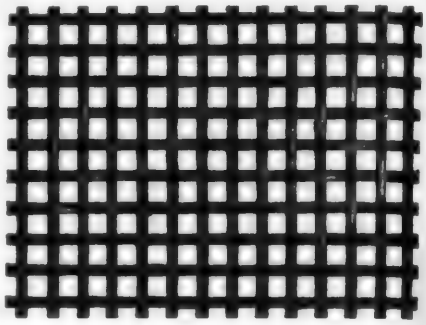

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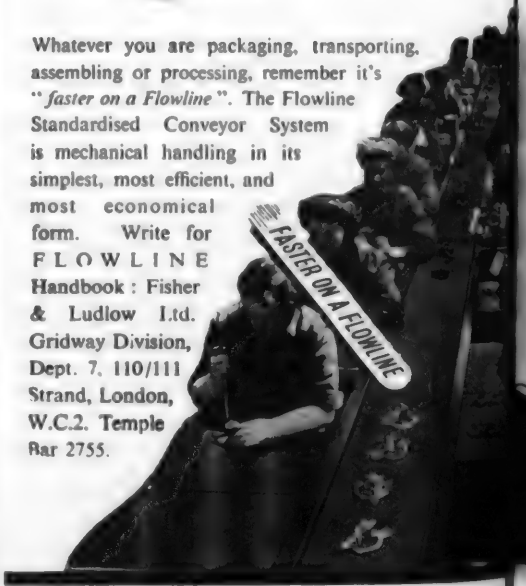

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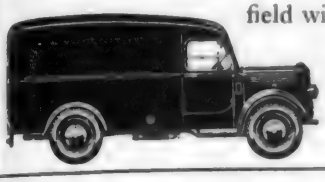

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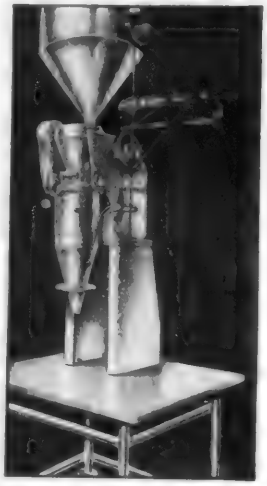

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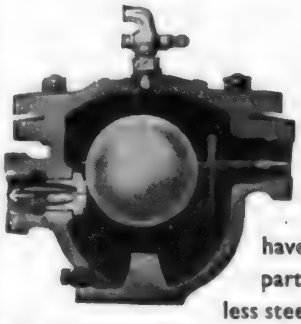

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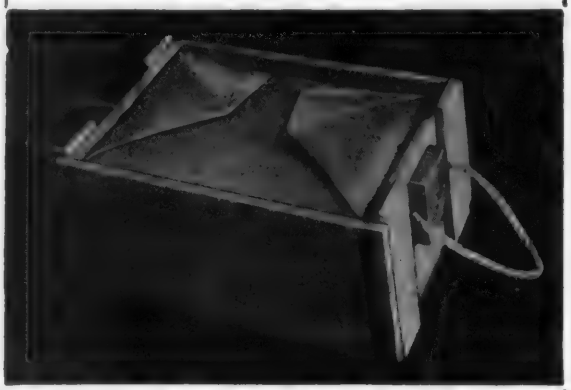

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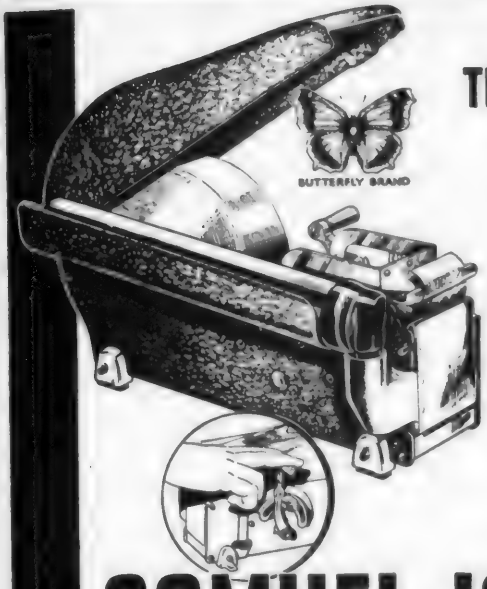

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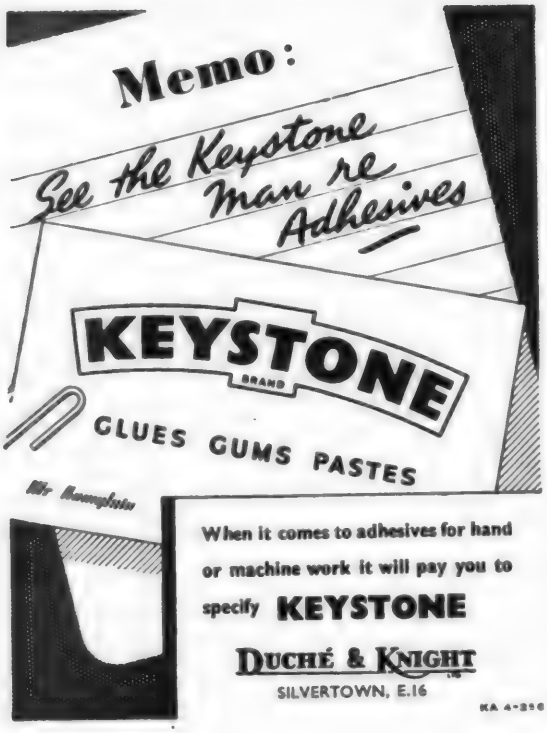
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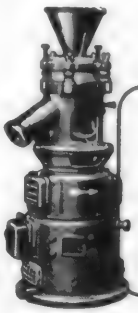

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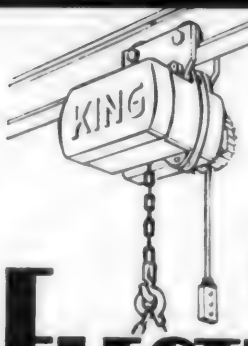

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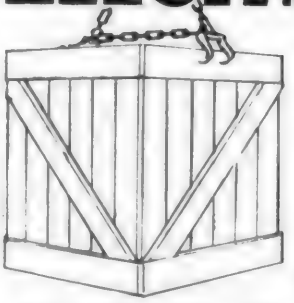

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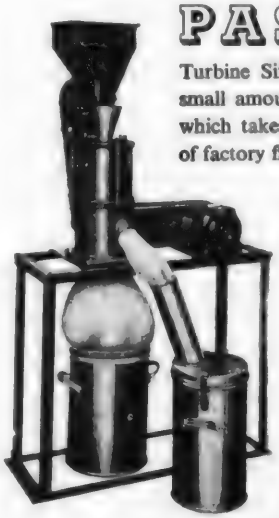

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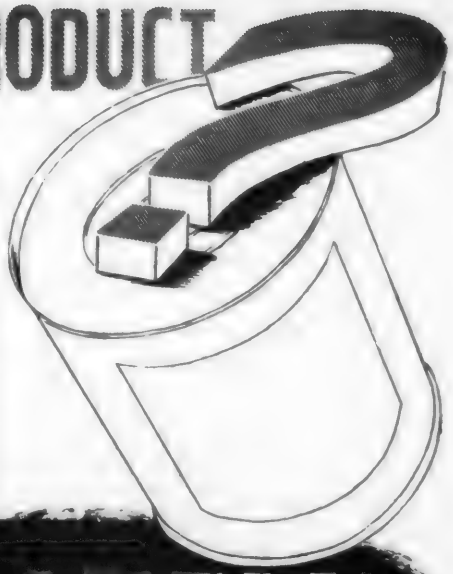

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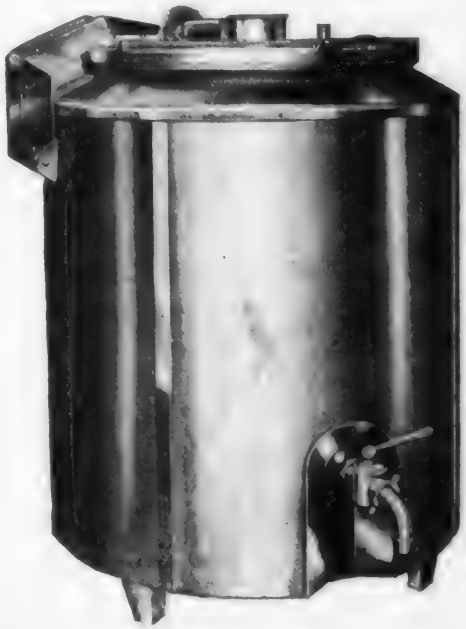

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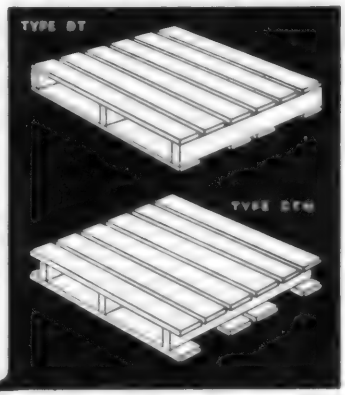

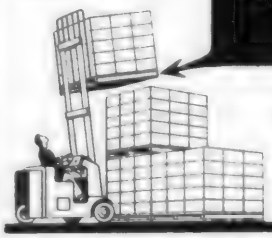

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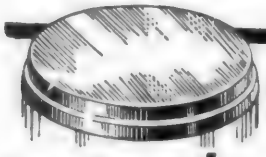

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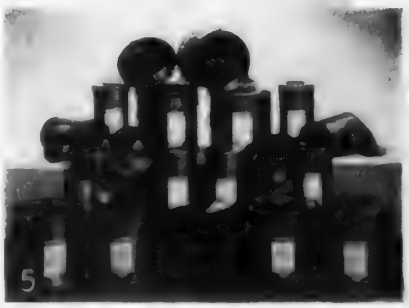

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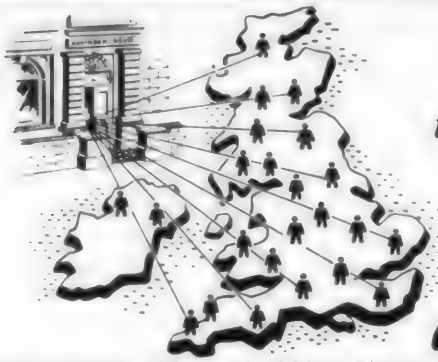

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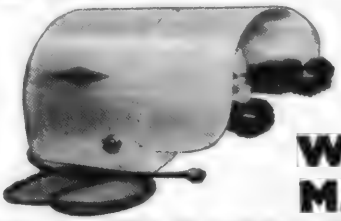

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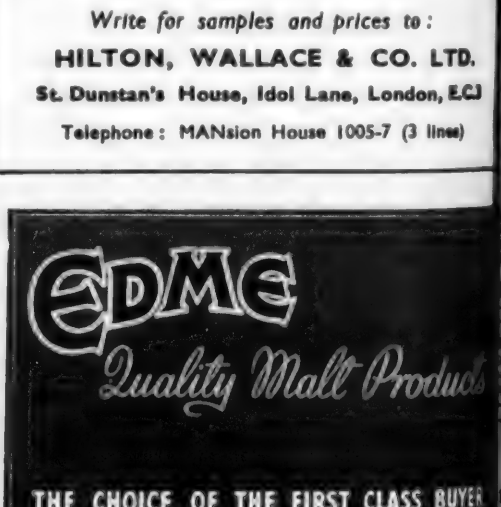

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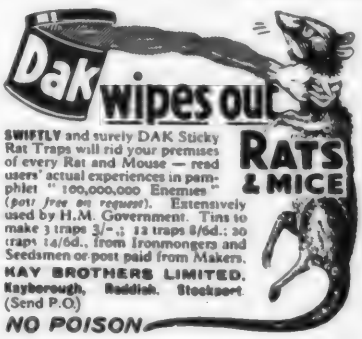

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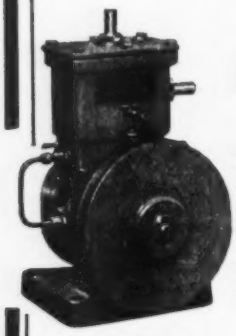

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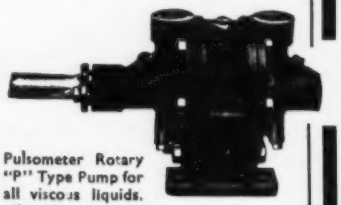

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